ESO 1700

Changing Patterns of Energy Consumption in Developing Countries

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ABSTRACT

This report documents the tasks of updating and analyzing the energy and macroeconomic data base for the 15 non-OPEC major energy consuming less developed countries (LDCs). The data base contains annual time-series data for 82 variables from 1960 to 1987. The trend analyses reveal that these 15 LDCs as a group continued to gain their share of total energy consumption in the world. The average annual growth rate of energy consumption during the 1960-87 period was 6.2% for the 15 LDCs and only 1.7% for the United States. It was also noted that the oil share of total primary energy consumption for the 15 LDCs continued to decline in 1987. However, the figure of 51% in 1987 was higher than that in the U.S. (45%) and the world (39%). The report also contains an analysis of energy and GDP relationships by income level. The Appendices provide detailed graphical presentations of important energy indicators by country.

Changing Patterns of Energy Consumption in Developing Countries

I. INTRODUCTION

This report documents the analyses of historical trends of energy consumption and production in the selected 15 major energy consuming less developed countries (LDCs). These 15 LDCs are Argentina, Brazil, Chile, Colombia, Egypt, India, South Korea, Malaysia, Mexico, Pakistan, Peru, The Philippines, Singapore, Thailand, and Taiwan. Under this project, an energy/economic data base was developed. This data base contains 52 energy variables and 30 macroeconomic and demographic variables. The data are annual time-series for the 1960-87 period. This data base is available in PC diskettes and hard copy.

This report presents descriptive and trend analyses of selected energy statistics based on the energy/economic data series developed under this project. Specifically, these trend analyses focus on aggregate energy indicators and energy/GDP relationships in these 15 LDCs.

II. AGGREGATE ENERGY INDICATORS

Total Energy Consumption and Production

Table 1 presents the total primary energy consumed and produced by the 15 LDCs in comparison with the United States, OPEC and the world for selected years. In 1987 the 15 LDCs consumed 586.4 million tons of crude oil equivalent (TOE) of primary energy, a 7.1% increase over the previous year's consumption of 547.6 million TOE.

Table 1: Total Primary Energy Consumption and Production in 15 LDCs, U.S., OPEC, and the World.

Year	Consumption (10^6 TOE) (% of World)				Production (10^6 TOE) (% of World)			
	15 LDCs	U.S.	OPEC	World	15 LDCs	U.S.	OPEC	World
1960	114.5	1018	31.6	2743	90.3	983.9	450.1	2919
	(4.2)	(37.1)	(1.2)	(100)	(4.0)	(33.7)	(15.1)	(100)
1965	161.9	1227	40.3	3418	132.9	1166	736.8	3671
	(4.7)	(35.9)	(1.2)	(100)	(3.6)	(31.8)	(20.1)	(100)
1970	225.4	1552	63.5	4485	179.7	1464	1200	4883
	(5.0)	(34.6)	(1.4)	(100)	(3.7)	(30.0)	(24.6)	(100)
1975	306.6	1582	102.6	5210	220.4	1367	1416	5609
	(5.9)	(30.4)	(2.0)	(100)	(3.9)	(24.4)	(25.2)	(100)
1980	435.4	1655	172.1	6014	372.5	1424	1450	6429
	(7.2)	(27.5)	(2.9)	(100)	(5.8)	(22.1)	(22.6)	(100)
1985	522.1	1598	237.6	6439	544.8	1414	967	6664
	(8.1)	(24.8)	(3.7)	(100)	(8.2)	(21.2)	(14.5)	(100)
1986	547.6	1594	253.5	6555	558.6	1395	1100	6898
	(8.4)	(24.3)	(3.9)	(100)	(8.1)	(20.2)	(15.9)	(100)
1987	586.4	1626	266.7	6758	592.9	1391	1086	7035
	(8.7)	(24.1)	(3.9)	(100)	(8.4)	(20.0)	(15.4)	(100)

Although these 15 LDCs accounted for only 8.7% of the world total energy consumption in 1987, the rate of increase was relatively high. By comparison, the United States recorded only a 2% increase in total energy consumption in 1987 over 1986. In addition, the 15 LDCs' shares of world total energy consumption has increased steadily since 1960. In 1960, the 15 LDCs consumed only 4.2% of the total primary energy consumed by the world. In less than three decades, the 15 LDCs more than doubled their share of energy consumption, while the U.S. share reduced from 37% to 24% over the same period. As shown in Table 3, the average annual growth rate of energy consumption during the 1960-87 period is 6.2% for the 15 LDCs, and only 1.7% for the United States.

Table 1 also shows similar statistics of primary energy production. In 1987, the 15 LDCs produced 592.9 million TOE of primary energy, about 8.4% of world total primary energy production in that year. Compared with 1986, the 1987 figure of production represents an increase of 6.1%. Like energy consumption, the 15 LDCs' share of energy production is only a small fraction of the world energy production, but the growth of the 15 LDCs share has been noticeable. While the U.S. share of world energy production dropped from 33.7% in 1960 to 20% in 1987, and the OPEC's share in 1987 remained at the 1960's level after fluctuations in 1970s, or more precisely at 15.4%, the 15 LDCs recorded a gradual increase in their share of world energy production over the period of 1960 to 1987. Note that the figures of energy consumption and production for the world are not the same for each year. The differences reflect, according to the United Nations, inventory changes, unallocated quantities and consumption by sea maritime. These statistics of energy consumption and production show that the 15 LDCs as a group, has

achieved a self-sufficiency in primary energy in recent years. Specifically, since 1982 the 15 LDCs as a group has produced more primary energy than their primary energy consumption. As shown in Table 3, the average annual growth rate of primary energy production during 1960 - 1987 is 7.2% for the 15 LDCs, which is one percentage point higher than their average annual growth rate of the primary energy consumption during the same period. The historical trends of primary energy consumption, production, import and export by country are presented in Appendix A.

Total Oil Consumption and Production

Table 2 presents total oil consumption and production in these 15 LDCs, as well as in the U.S., OPEC, and the world, for selected years from 1960 to 1987. In 1987, the 15 LDCs consumed 299.2 million TOE of crude oil. This figure represents a 6% increase over the 282.5 million TOE of crude oil consumed in 1986. In a global perspective, it accounted for 11% of the world total oil consumption in 1987.

Since oil is the dominant primary energy source in these 15 LDCs (Table 4), the pattern of growth in total primary energy consumption and production described in the previous section reflects, by and large, the pattern of growth in oil consumption and production. Although the 15 LDCs historically consumed only a small part of the world total oil consumption, it is the fast rate of increase in oil consumption in these countries that has attracted so much attention. During 1960-1987, the primary oil consumption in these 15 LDCs increased by 5.7% a year on average, as compared with a growth rate of 1.9% in the United States (Table 3). However, the pre-1973 period had the highest

Table 2: Total Oil Consumption and Production in 15 LDCs, U.S., OPEC and the World.

Year	Consumption (10^6 TOE) (% of World)				Production (10^6 TOE) (% of World)			
	15 LDCs	U.S.	OPEC	World	15 LDCs	U.S.	OPEC	World
1960	66.2	441	20.9	914.8	43.5	384.3	439.6	1091
	(7.2)	(48.2)	(2.3)	(100)	(4.0)	(35.2)	(40.1)	(100)
1965	90.3	516	24.1	1327	62.2	430.8	720.0	1568
	(6.8)	(38.9)	(1.8)	(100)	(4.0)	(27.5)	(45.9)	(100)
1970	139.2	665	37.6	1970	93.5	535.3	1173	2362
	(7.1)	(33.8)	(1.9)	(100)	(4.0)	(22.7)	(49.7)	(100)
1975	191.1	729	64.4	2385	108.2	470.9	1364	2738
	(8.0)	(30.6)	(2.7)	(100)	(4.0)	(17.2)	(49.8)	(100)
1980	262.0	749	110.6	2685	214.6	480.0	1368	3095
	(9.8)	(27.9)	(4.1)	(100)	(6.9)	(15.5)	(44.2)	(100)
1985	269.2	687	150.0	2541	319.4	497.7	838	2794
	(10.6)	(27.0)	(5.9)	(100)	(11.4)	(17.8)	(30.0)	(100)
1986	282.5	715	148.3	2602	318.1	482.2	953	2933
	(10.9)	(27.5)	(5.7)	(100)	(10.8)	(16.4)	(32.5)	(100)
1987	299.2	727	146.2	2649	331.6	474.3	929	2942
	(11.3)	(27.4)	(5.5)	(100)	(11.3)	(16.1)	(31.6)	(100)

Table 3: Growth Rates of Energy Consumption and Production by Group

Group/Period	Average Annual Growth Rate (%)			
	Oil Consumption	Oil Production	Energy Consumption	Energy Production
15 LDCs: 1960-73	7.9	5.9	7.0	5.7
1973-79	6.3	12.5	7.0	10.2
1979-87	2.0	7.5	4.4	7.4
1960-87	5.7	7.8	6.2	7.2
U.S.: 1960-87	1.9	0.8	1.7	1.3
OPEC: 1960-87	7.5	2.8	8.2	3.3
World: 1960-87	4.0	3.7	3.4	3.3

Table 4: Share of Oil in Total Primary Energy Consumption

Year	Oil Share (%)			
	15 LDCs	U.S.	OPEC	World
1960	58	43	66	33
1965	56	42	60	39
1970	62	43	59	44
1975	62	46	63	46
1980	60	45	64	45
1985	52	43	63	39
1986	52	45	59	40
1987	51	45	55	39

annual growth rate of 7.9%. The annual growth rate reduced to 6.3% during the period of 1973-1979. After the second oil price shock, the average annual growth rate dropped further to 2.0% (Table 3). The historical trends of primary oil consumption are also presented in Appendix B. We can see clearly from the graph that the oil consumption curve for the 15 LDCs leveled off after the second oil price shock in early 1980s. Prior to that there was a relatively smooth increasing trend for two decades.

While the increasing primary oil consumption trend slowed down after the second oil price shock, oil production for this group of 15 LDCs increased dramatically during the period of 1973-1980. As Table 3 shows, the average annual rate of increase in oil production during this period was 12.5%, which was more than twice of the rate in the pre-1973 period (5.9%). With this fast rate of increase, these 15 LDCs as a group were able to become self-sufficient in oil by 1982. Ever since 1982, these 15 LDCs produced more oil than they consumed.

The importance of oil production in the 15 LDCs can also be seen from Table 2. In the years before 1980 the 15 LDCs produced only 4% of total world oil production. By 1987 the 15 LDCs' share of world oil production increased to 11.3%. In comparison, the oil production in the 15 LDCs in 1975 was equivalent to 23% of oil produced in the United States or 8% of oil produced by OPEC. By 1987, the amount of oil produced by these 15 LDCs was equal to 70% of U.S. oil production or 35% of OPEC's oil production.

The rapid increases in oil production in the 15 LDCs have been mainly due to rapid increases in oil productions in mid-1970s and early 1980s in Egypt, Malaysia,

Mexico, Peru, India, and Brazil, particularly the former four countries, which produced more oil than they consumed each year immediately after the first world oil crisis. Both Brazil and India dramatically increased their oil production in early 1980s and both became self-sufficient in oil, ending a long history of their dependency on foreign sources. Argentina has been able to satisfy its domestic oil demand with its own oil production since early 1960s. Colombia historically produced more oil than its domestic demand. However, its oil production decreased during the 1970 to 1980 period, then gradually picked up from 1980 to 1985. In 1987, Colombia doubled its 1985 oil production level. Since 1986, Colombia has become a net oil exporting country. All the other countries of these 15 LDCs, except Singapore, Thailand, and Taiwan, produced some oil in early 1980s.

The historical trends of primary oil consumption, production, import and export by country are presented in Appendix B.

III. ENERGY AND GDP RELATIONSHIPS BY INCOME LEVEL

For the purpose of conducting a cross country comparison, the 15 LDCs are divided into two broad income groups according to their per capita real GDP in 1982, following the World Bank classification. The first group includes low-income economies, with the 1982 real per capita GDP less than 410 U.S. dollars. The second group consists of middle-income economies, with the 1982 real per capita GDP of $410 or more. The middle-income economies are further subdivided into two subgroups, lower middle-income economies and upper middle-income economies. Table 5 shows the grouping of

Table 5: Real Per Capita GDP and Energy Consumption in 15 LDCs.

Classification/ Country	Real Per Capita GDP (1982 $)				Per Capita Energy Consumption (TOE/Person)			
	1960	**1970**	**1982**	**1987**	**1960**	**1970**	**1982**	**1987**
	LOW-INCOME (BELOW $410)							
India	188	221	257	303	.07	.10	.15	.19
Pakistan	184	279	350	406	.09	.09	.16	.19
	MIDDLE-INCOME ($410 OR MORE) **Low Middle-Income**							
Egypt	293	358	583	652	.18	.18	.41	.47
Thailand	290	460	733	897	.04	.13	.25	.34
Philippines	454	547	769	658	.10	.20	.21	.18
	Upper Middle-Income							
Peru	1044	1286	1417	1395	.28	.41	.45	.40
Colombia	840	1038	1449	1595	.33	.39	.58	.58
Argentina	1256	1798	1691	1707	.73	1.10	1.17	1.34
Malaysia	730	1052	1850	1956	.17	.39	.62	.88
Korea	540	907	1893	2909	.14	.45	.97	1.23
Taiwan	505	902	2020	2962	.32	.60	1.30	1.77
Chile	2086	2185	2112	2353	.49	.79	.64	.66
Brazil	936	1259	2135	2372	.21	.30	.49	.54
Mexico	1123	1610	2358	2104	.49	.70	1.33	1.21
Singapore	*1389*	*2651*	*6176*	*7472*	*.25*	*2.59*	*2.73*	*3.52*

these 15 LDCs according to this World Bank classification and their real per capita GDP in 1982 U.S. dollars for the years of 1960, 1970, 1982, and 1987. Note again that the grouping is based on the real per capita GDP in 1982. During the period of 1960 to 1987, two countries, Egypt and Thailand, moved from the low-income group into the low middle-income group, while five other countries, namely, Brazil, Colombia, Korea, Malaysia, and Taiwan moved from the low middle-income group into the upper middle-income group. These changes occurred around early 1970s. Since the mid-1970s, the grouping has remained unchanged.

Table 5 also presents per capita energy consumption in these 15 LDCs for these four selected years of 1960, 1970, 1982, and 1987. These statistics show an obvious trend that a higher per capita energy consumption is generally associated with a higher per capita income. Egypt is the only exception that its per capita energy consumption in 1987 was higher than Peru, an upper middle-income country.

The energy and income relationships are further highlighted in Table 6, in which the mean values of per capita energy consumption are presented for each income group. Countries in a higher income group consume significantly more energy per person on average than countries in a lower income group. However, there are large variations in per capita energy consumption across countries in the upper middle-income group. These variations do not seem to be related to the level of real per capita GDP, but rather to a country's specific energy-economy structure. For example, the real per capita GDP in Argentina is lower than in Malaysia, Korea, Chile, and Brazil, in 1982 and 1987, but Argentina's per capita energy consumption was much higher than these countries.

Table 6: Mean Values for Per Capita Energy Consumption in Each Income Group (TOE/Person)

	Low-Income		Low Middle-Income		Upper Middle-Income	
1960	.08	(4)[a]	.20	(6)[a]	.52	(5)[a]
1965	.10	(4)	.24	(6)	.63	(5)
1970	.10	(3)	.29	(4)	.54	(8)
1975	.12	(3)	.21	(2)	.64	(10)
1980	.14	(2)	.28	(3)	.83	(10)
1981	.15	(2)	.28	(3)	.82	(10)
1982	.15	(2)	.28	(3)	.84	(10)
1983	.16	(2)	.29	(3)	.84	(10)
1984	.17	(2)	.30	(3)	.84	(10)
1985	.18	(2)	.30	(3)	.85	(10)
1986	.18	(2)	.31	(3)	.87	(10)
1987	.19	(2)	.33	(3)	.90	(10)

[a]*Numbers in parentheses are the number of countries in the group.*

Like countries in the other income groups, however, each individual country in the upper middle-income group increased its per capita energy consumption as its per capita income increased. Three countries, The Philippines, Peru, and Mexico experienced a decrease in per capita GDP from 1982 to 1987. Consequently, their per capita energy consumption also dropped during this period.

Theoretically, the relationships between GDP and energy consumption are bidirectional at the macro level. Energy is a factor of production for goods and services. An increase in energy consumption is expected to result in an increase in GDP. On the other hand, an increase in GDP would further stimulate energy consumption. Therefore, there is a two-way relationship between energy consumption and GDP. Empirical investigation of this relationship in LDCs are subjects of many studies. A commonly used econometric method are two causality tests, Granger test and Sims test. We are currently working on the statistical tests of this causual relationships between GDP growth and energy consumption. The results will be reported elsewhere.

IV. ENERGY/GDP AND OIL/GDP RATIOS

Energy (oil) consumption per unit of GDP, or energy/GDP (oil/GDP) ratio, is one of the most important indicators in understanding energy-economy interactions. This ratio reflects the joint effects of many factors in the economy. Among these factors, energy (oil) efficiency and structure of the economy are the most dominant and important ones. The lower this ratio, the more energy (oil) efficient an economy is in using energy (oil) as input in its production of total goods and services. This ratio also

measures the relative energy (oil) intensity of an economy. Note that some sectors or industries require more energy (oil) to produce a unit of product than other sectors or industries. Evidence in developed countries shows that the transportation sector is the most oil intensive sector, while chemical, papermill, and textiles are also very energy intensive industries. If a country's economic structure shifts from less energy (oil) intensive industries, say agriculture, to more energy (oil) intensive industries, it is expected that the energy/GDP (oil/GDP) ratio will increase. However, the course of economic development often involves transition from a less energy (oil) intensive economy to a more energy (oil) intensive economy, at the same time a transition from a less energy (oil) efficient economy to a more energy (oil) efficient economy, especially in face of higher energy (oil) prices. Therefore, the changes in energy/GDP (oil/GDP) ratio are the net results of these two forces. As shown in Appendix C, the historical trends of energy/GDP and oil/GDP ratios in these 15 LDCs exhibit similar patterns for countries in the same income group. The countries in the upper middle-income group (Argentina, Brazil, Chile, Colombia, Korea, Singapore, and Taiwan) excluding two oil exporting countries (Malaysia and Mexico) all reversed the increasing trend of oil/GDP ratio since either middle 1970s or early 1980s. Except for Argentina, the similar reversal of the trend also happened to the ratio of energy/GDP in this upper middle-income group. It needs to be further investigated whether or not the two world oil price shocks slowed down the economic development or increased energy/oil utilization efficiency in these upper middle-income LDCs.

Table 7 presents the year when the reversal of an increasing trend of energy/GDP and oil/GDP ratios occurred and the per capita GDP in 1982 U.S. dollar in that year in these upper middle-income oil importing countries. It is clear that the higher the per capita GDP, the sooner the energy/GDP and oil/GDP ratios started to decrease. Put it differently, it took one oil price shock to pull the energy/GDP and oil/GDP ratio down if the per capita GDP was above $1,705 in 1982 U.S. dollars. If the per capita GDP was $1445 in 1982 U.S. dollars or less, it took two world oil crises to do the job.

For low-income countries (India and Pakistan) the two world oil price shocks did not change the gradual smoothly increasing trend of energy/GDP and oil/GDP ratios. However, the two oil crises did insert significant impact on the trend of energy/GDP and oil/GDP ratios in the lower middle-income countries (Philippines and Thailand). The first oil price shock forced the increasing trend to slow down in Thailand and Philippines. Then the second oil price shock pulled the flat trend line downward. However, unlike the upper middle-income countries, the trends appeared to move up again in the mid 1980s. It is reasonable to assume that had there been no oil crises, the trends of energy/GDP and oil/GDP would have continued to increase in Thailand and The Philippines.

Table 7: Turning Point (Year) for Reversing the Increasing Trends of Energy/GDP and Oil/GDP Ratios

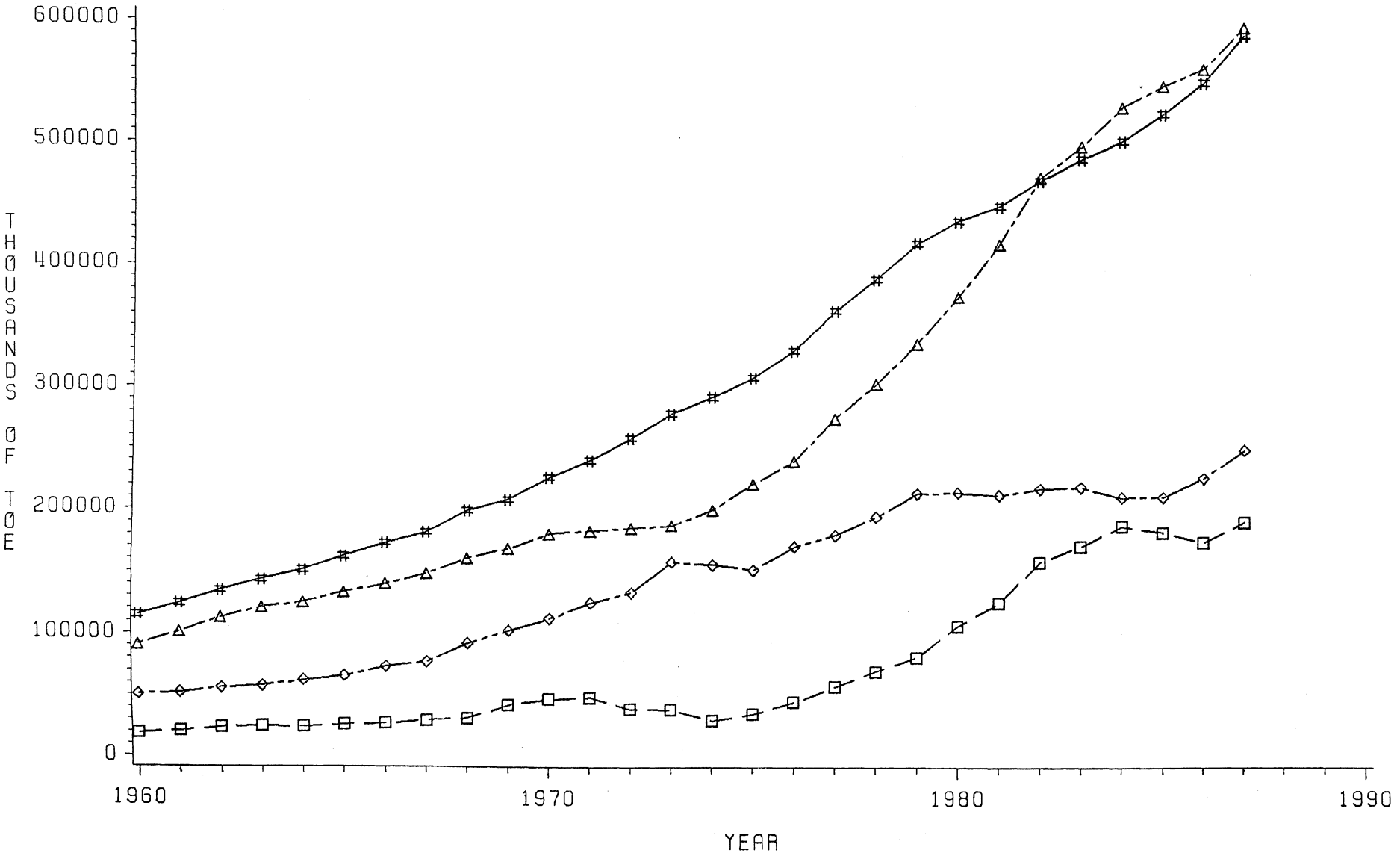
Country	Turning Point Year	Per Capita GDP (1982 U.S. $) in That Year
Chile	1973	2118
Singapore	1978	4620
Brazil	1978	2042
Taiwan	1978	1622
Korea	1980	1705
Colombia	1983	1445
Peru	1983	1214

APPENDIX A

Primary Energy Consumption, Production, Import and Export

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

15 LDCS

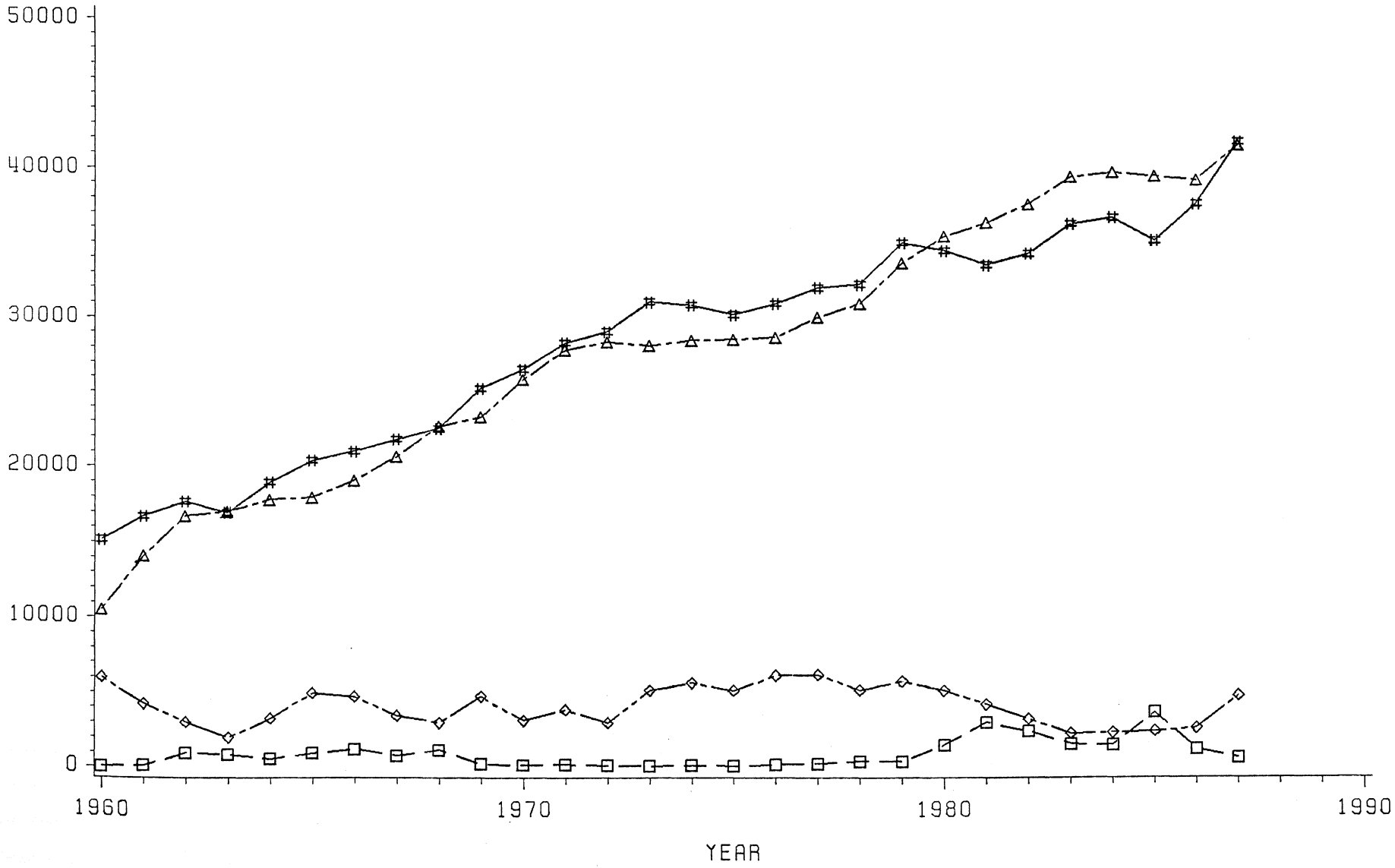


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

ARGENTINA

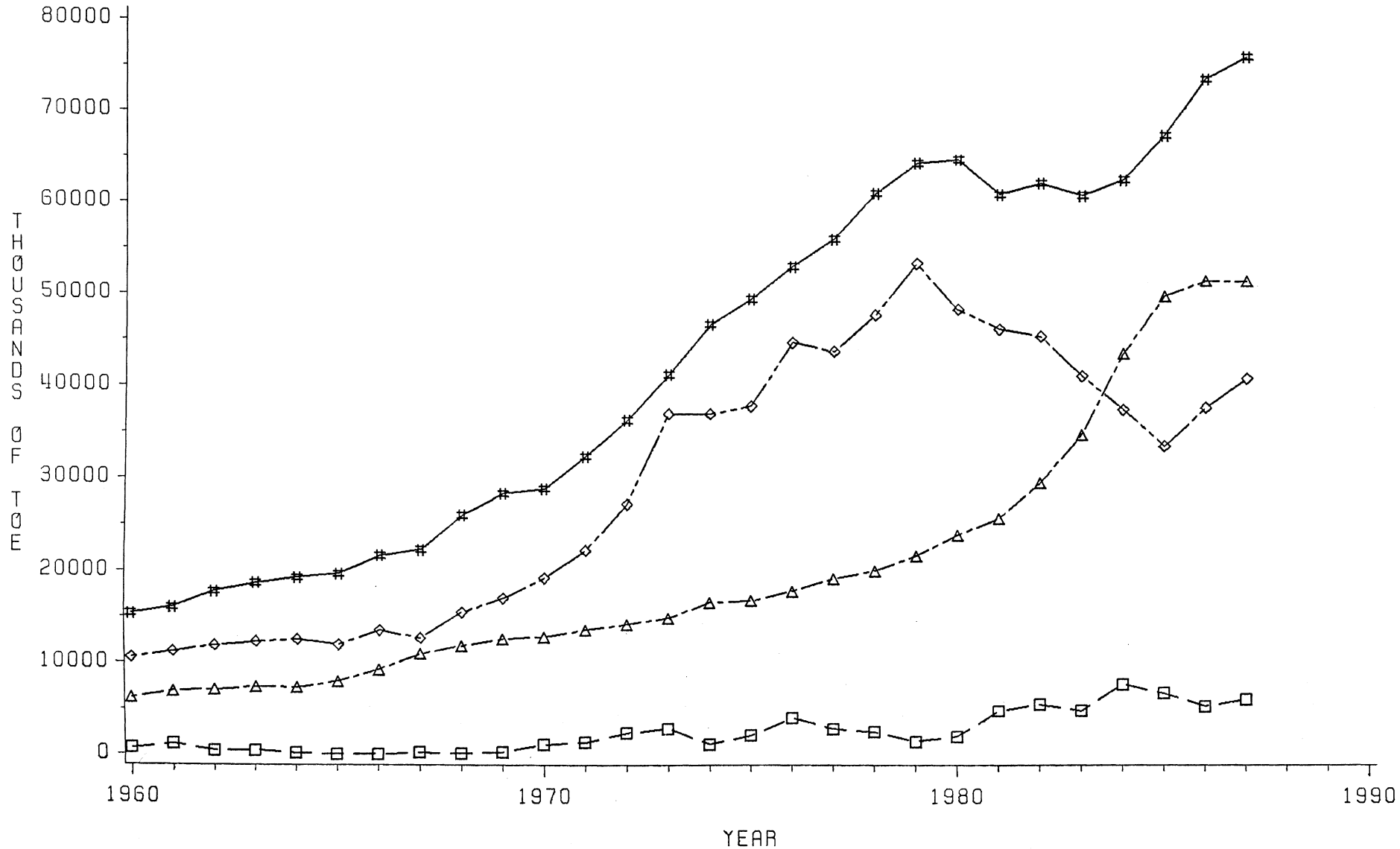


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

BRAZIL

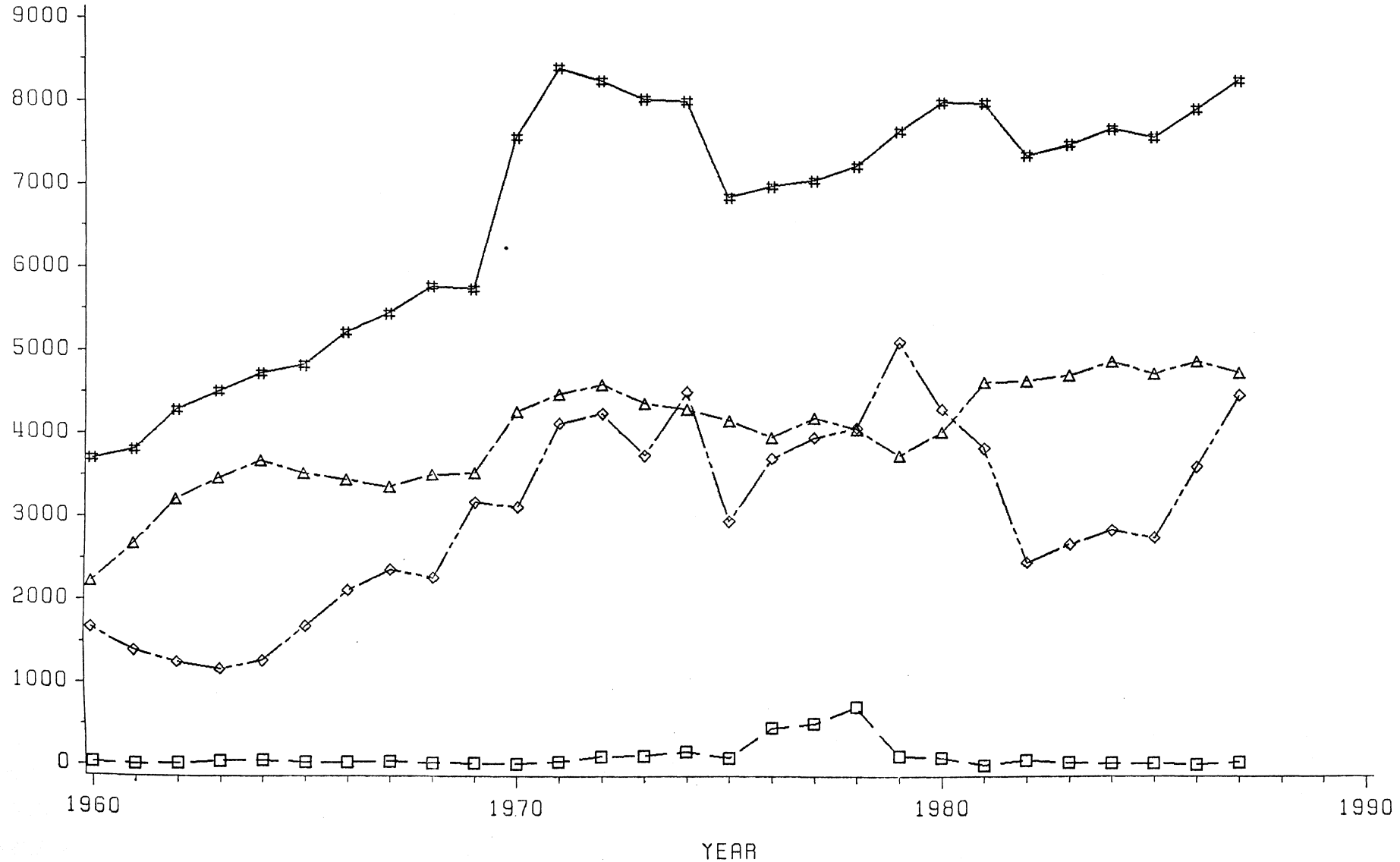


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

CHILE

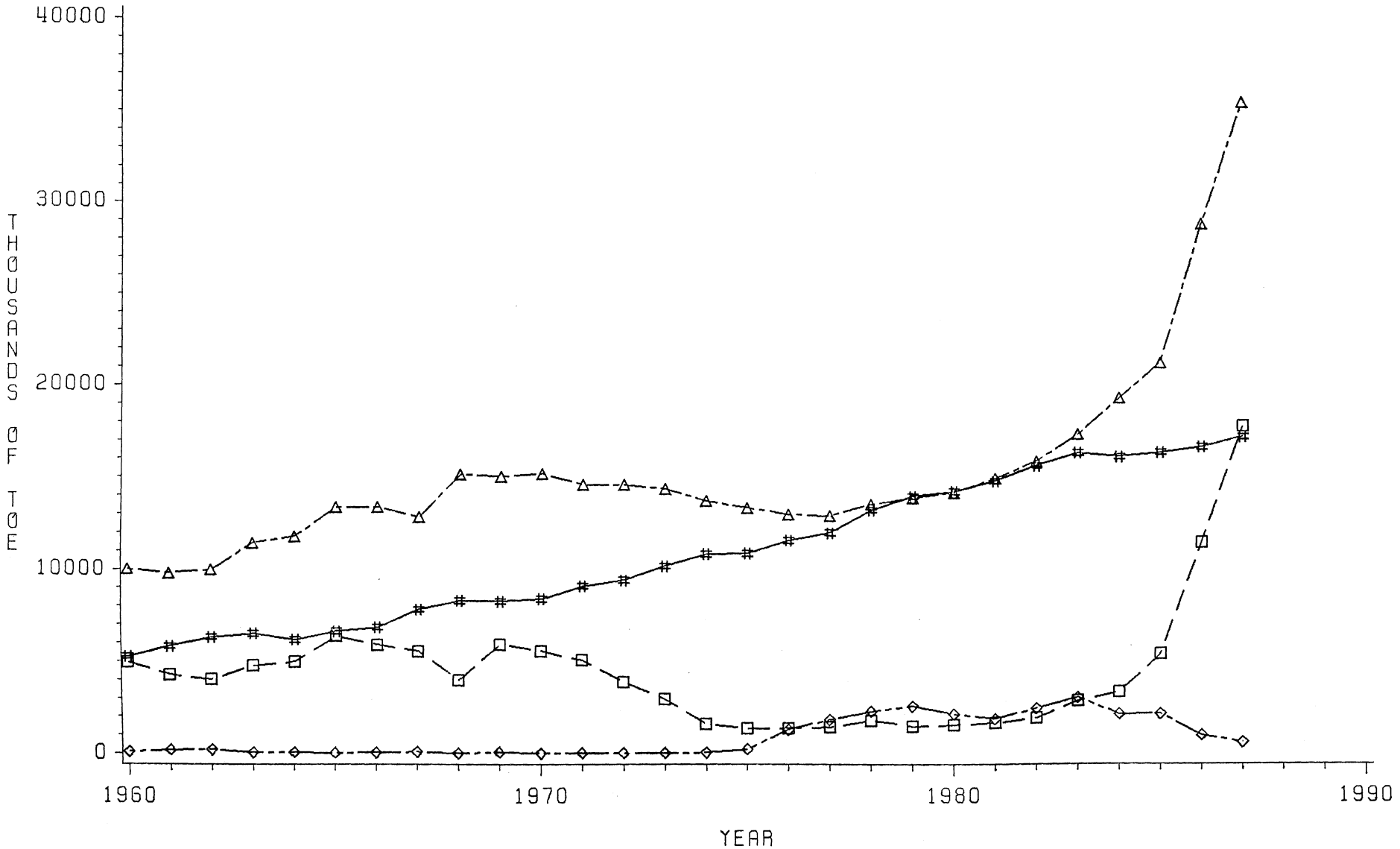


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

COLOMBIA



ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

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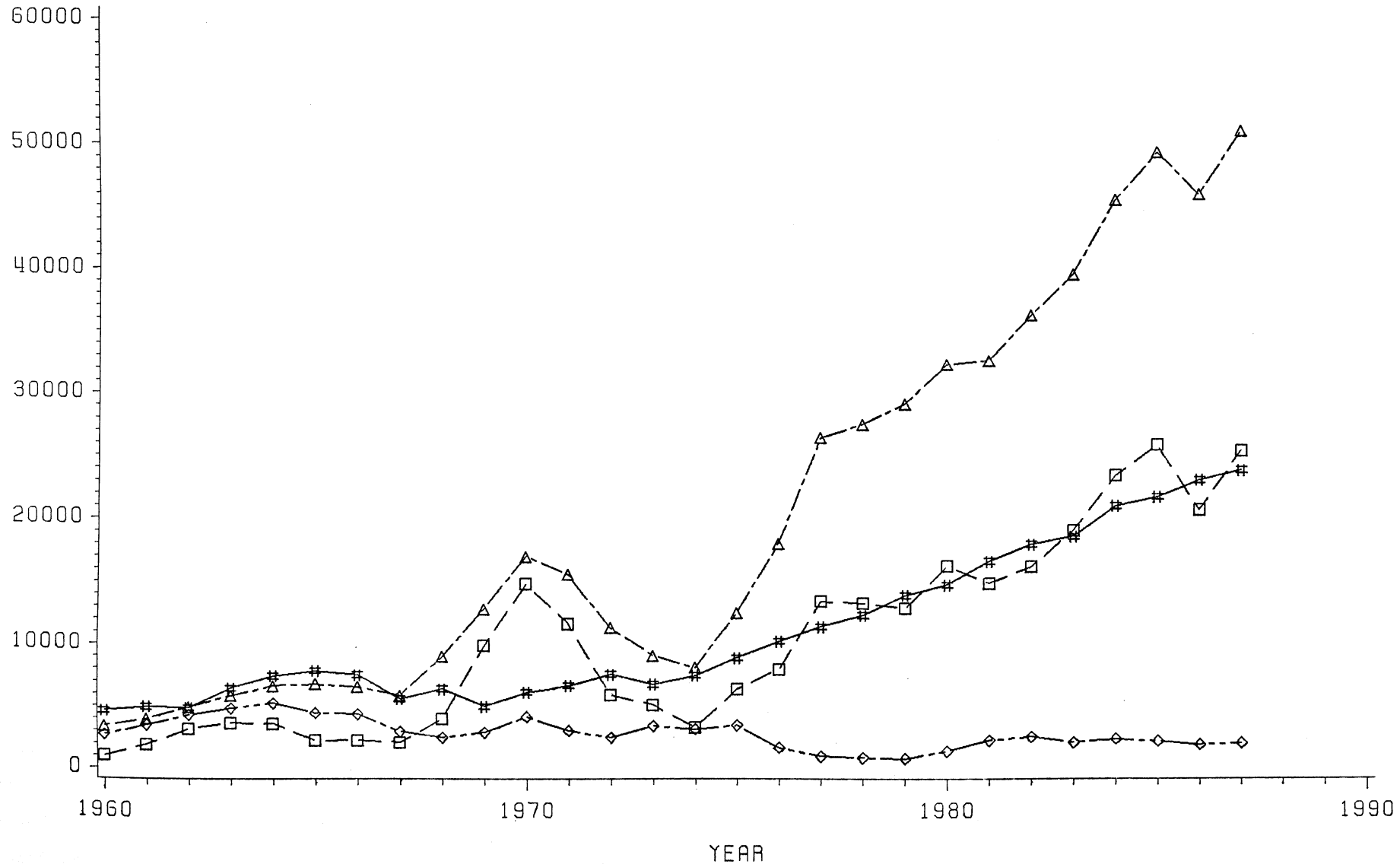
ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

EGYPT

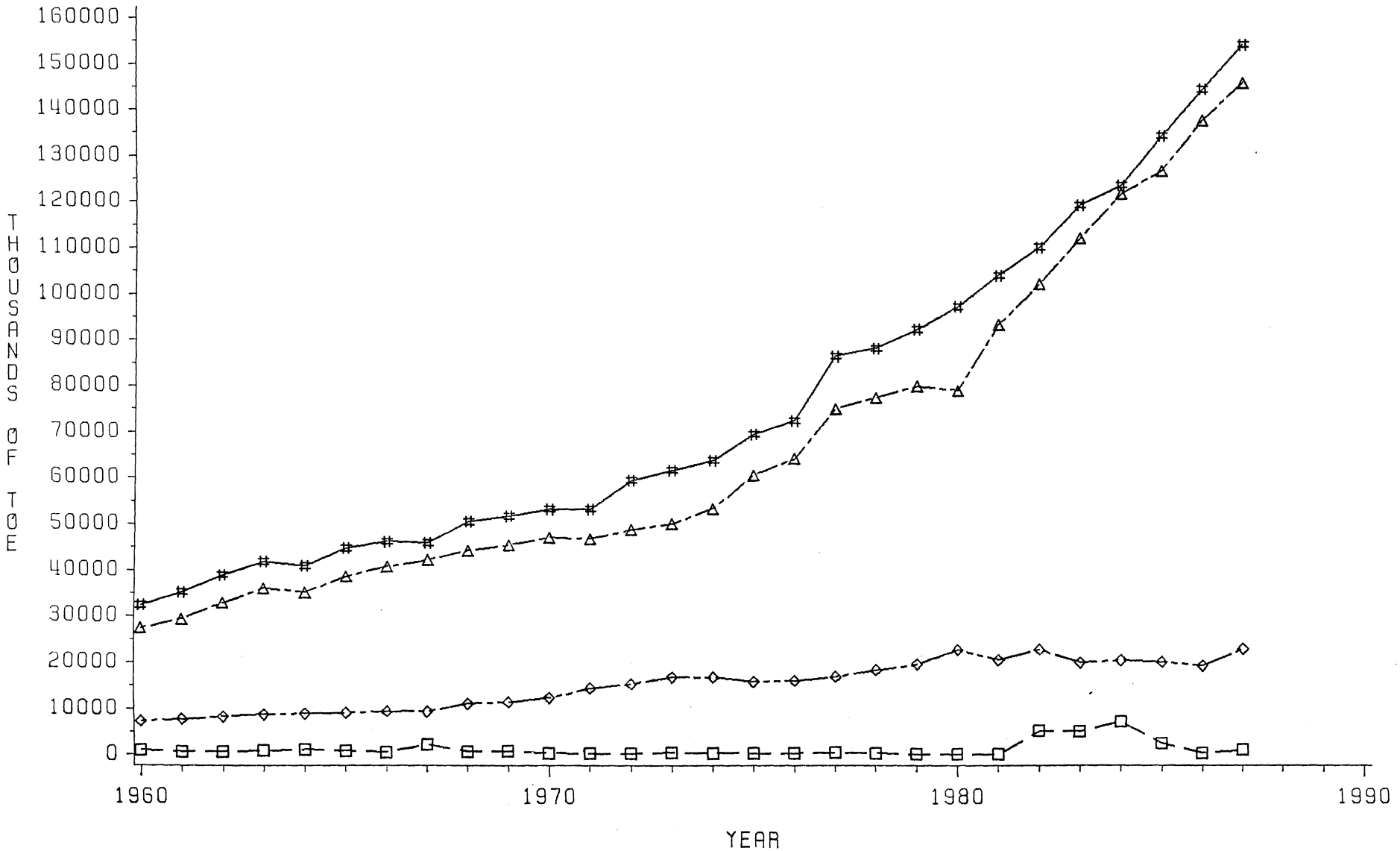


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

INDIA

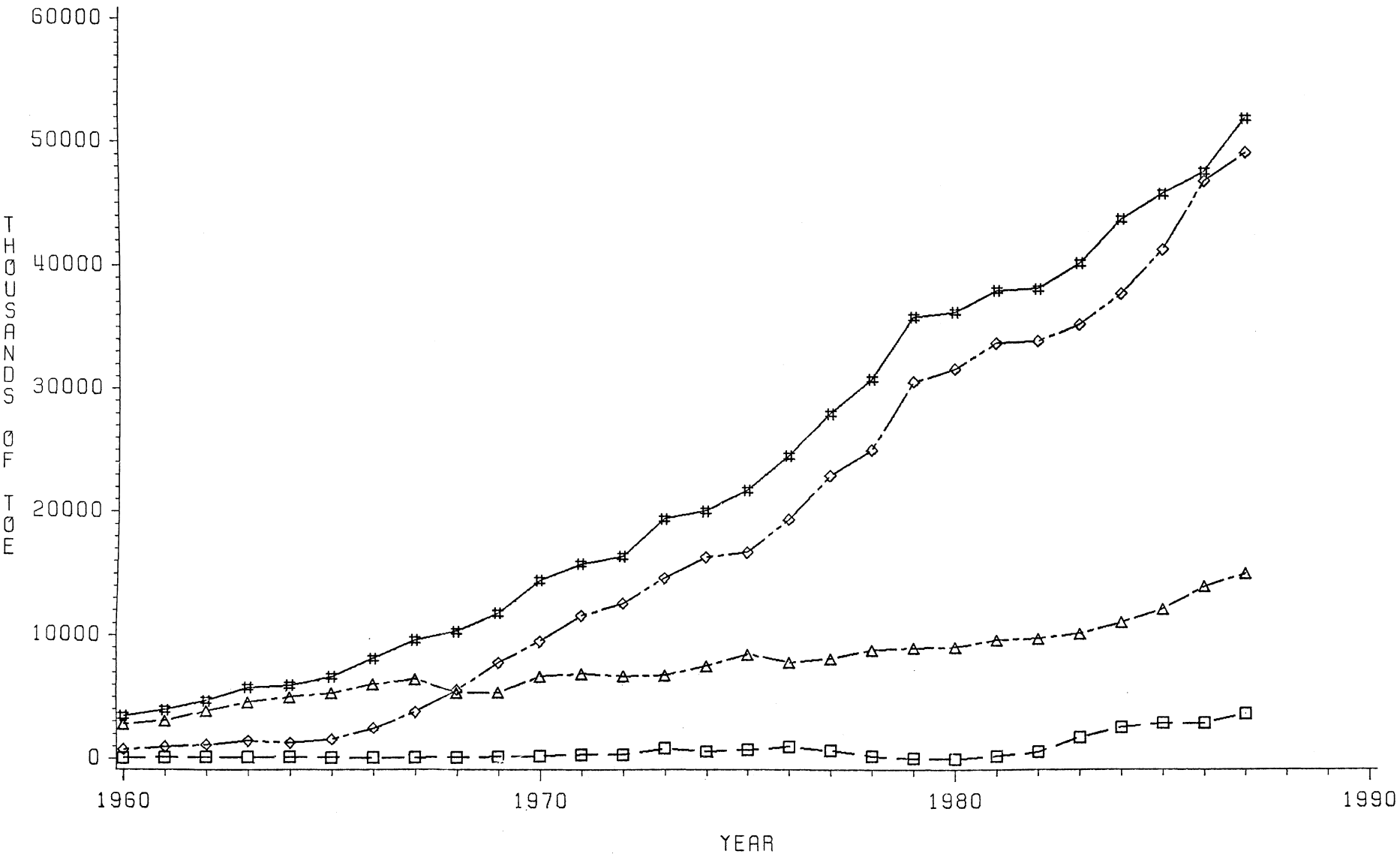


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

KOREA

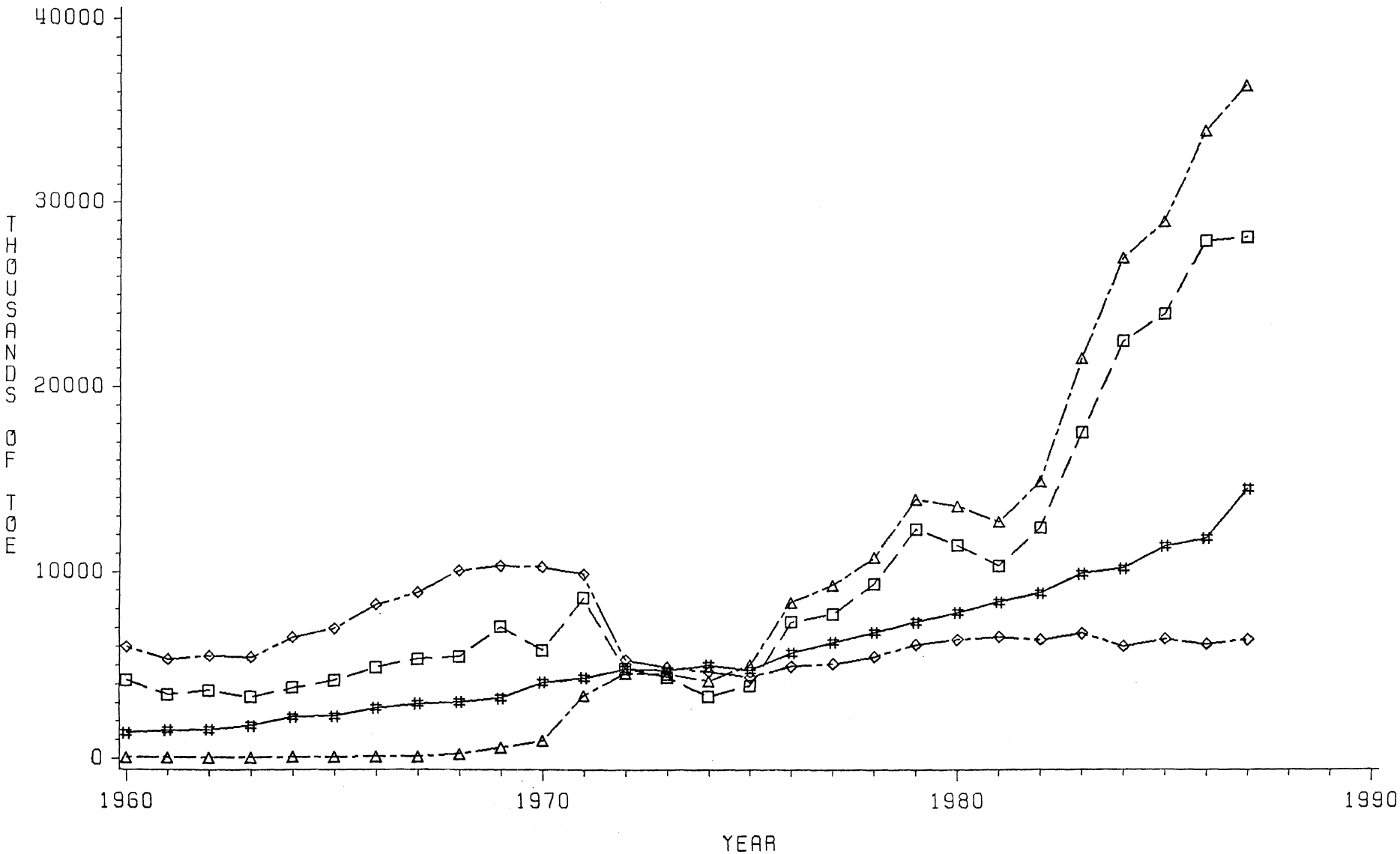


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

MALAYSIA

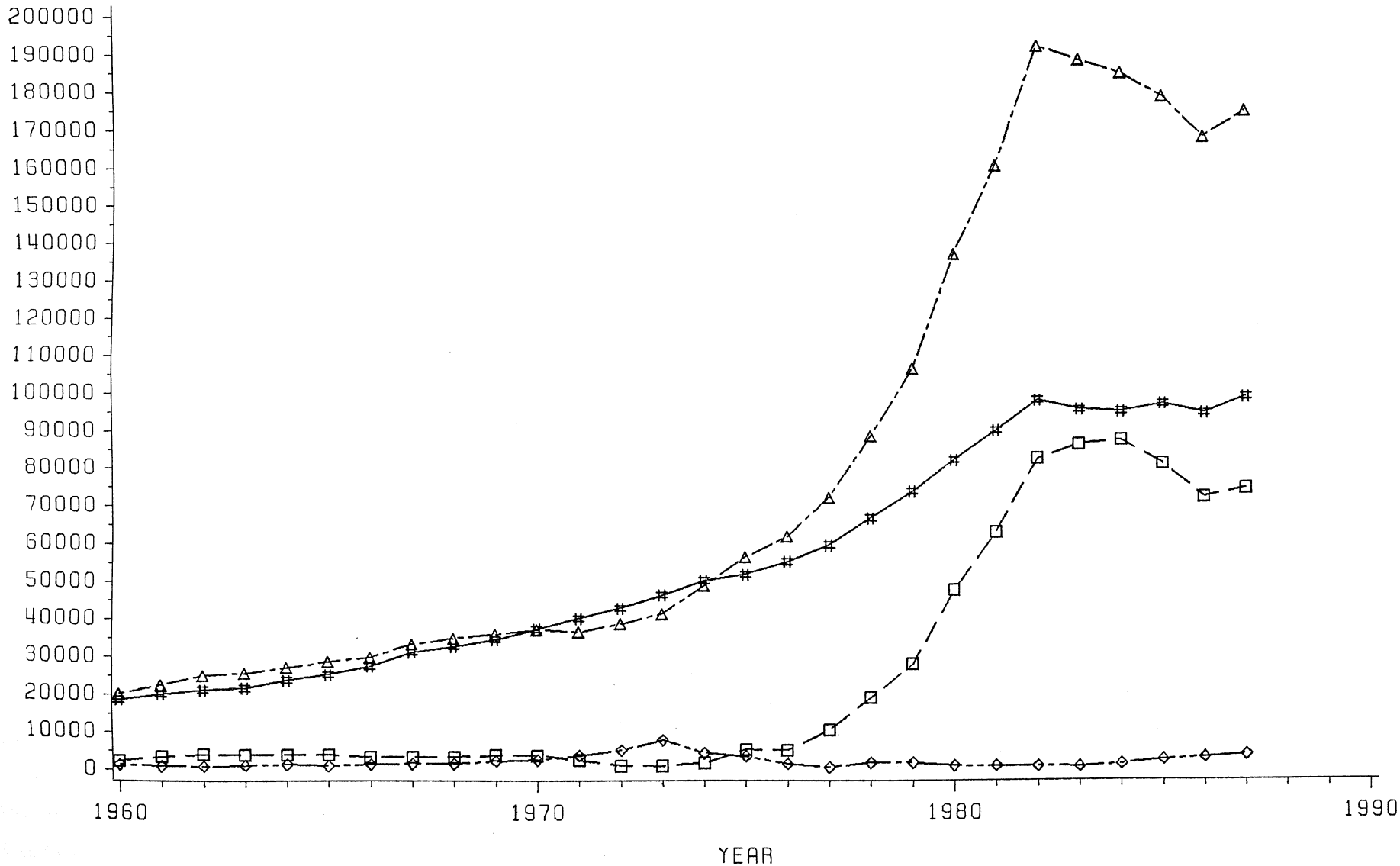


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

MEXICO

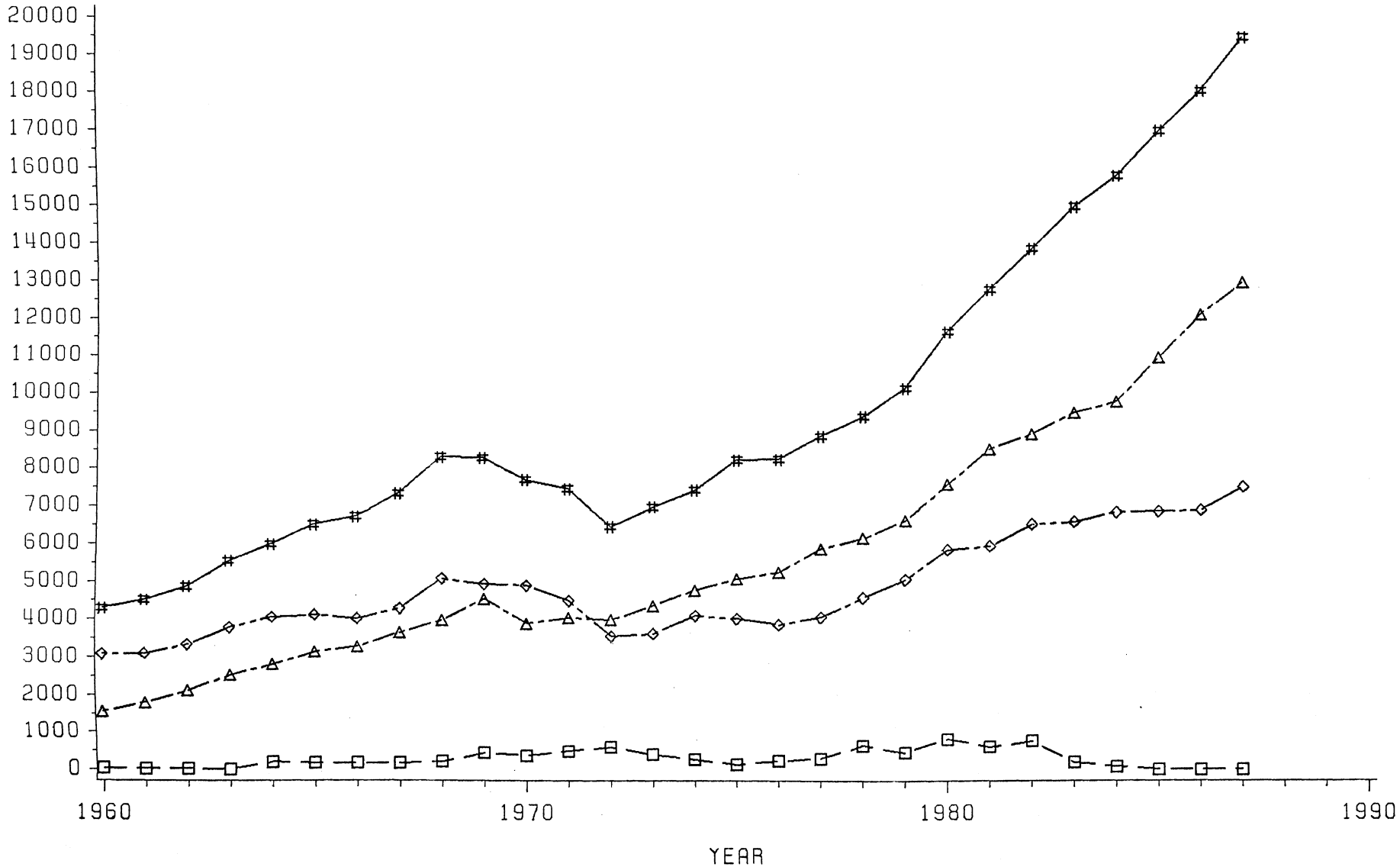


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

PAKISTAN

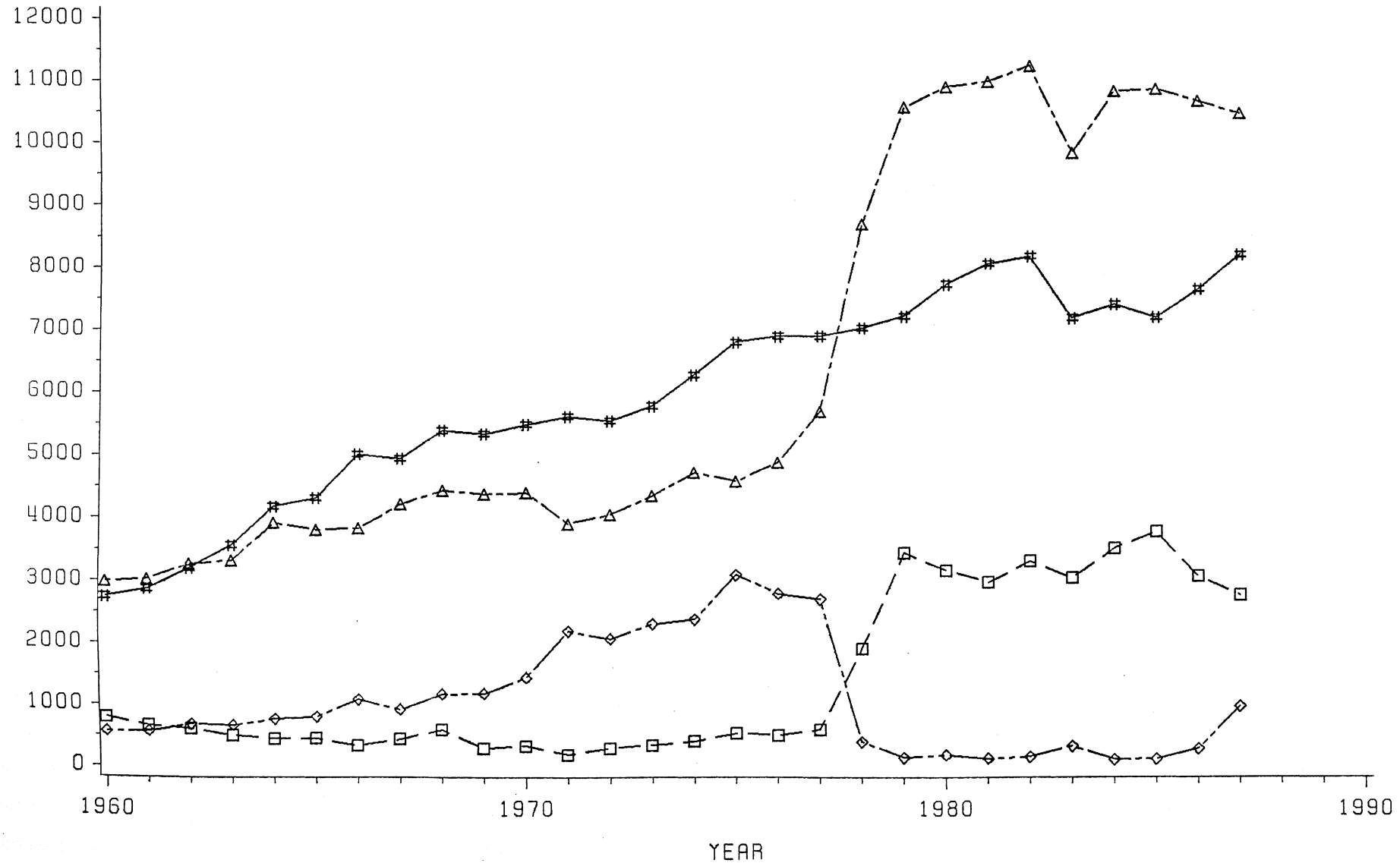


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

PERU

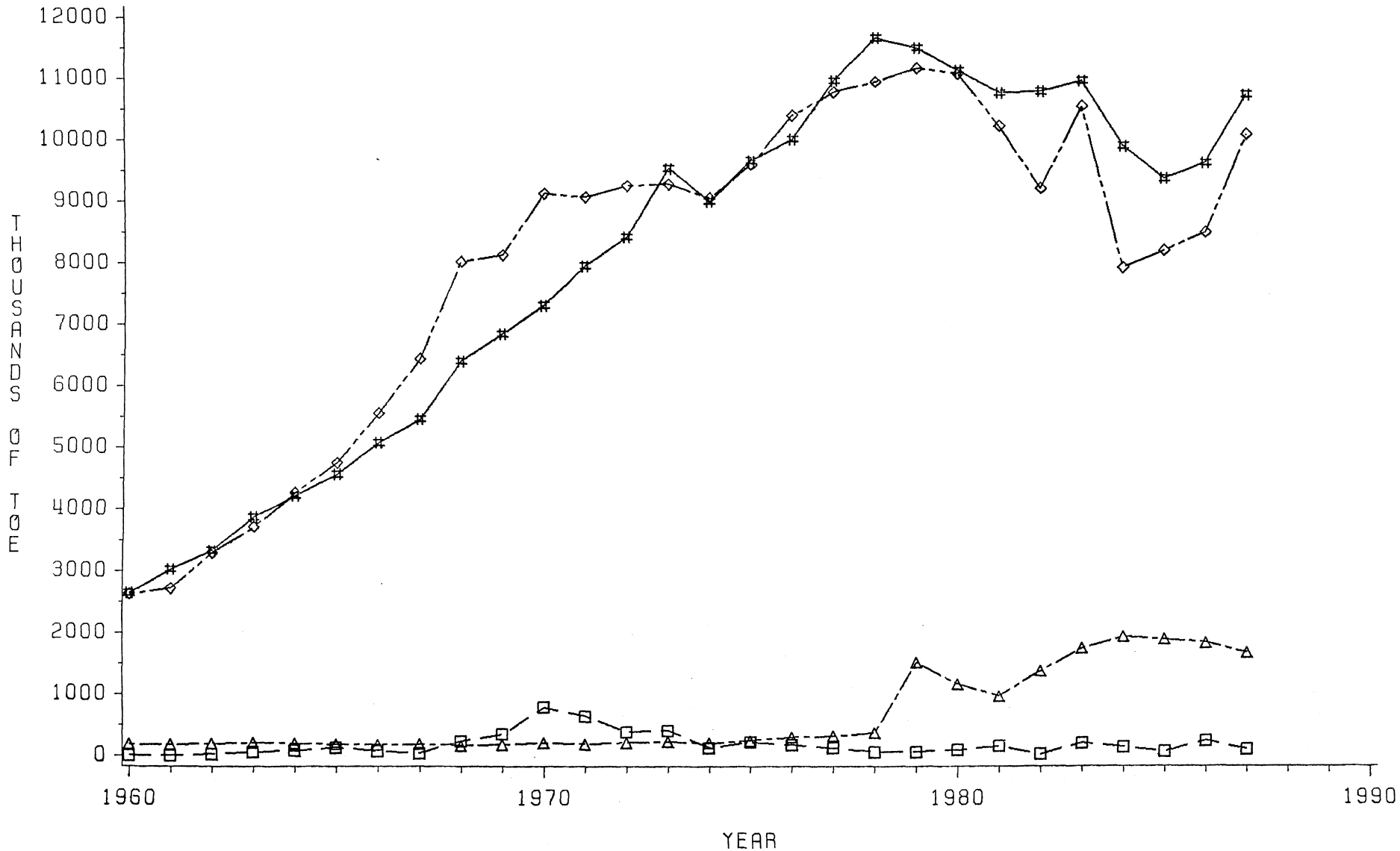


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

PHILIPPINES

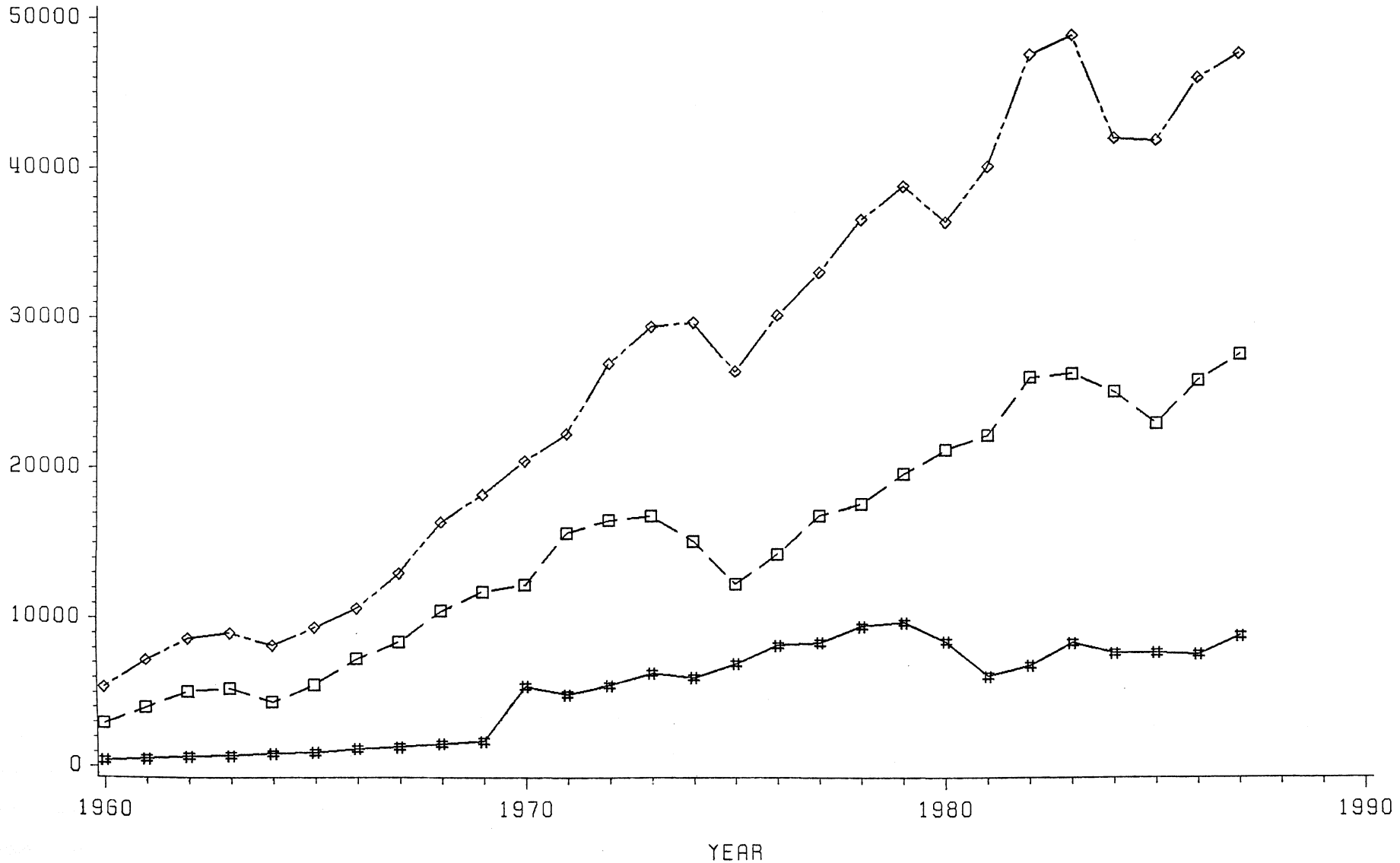


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

SINGAPORE

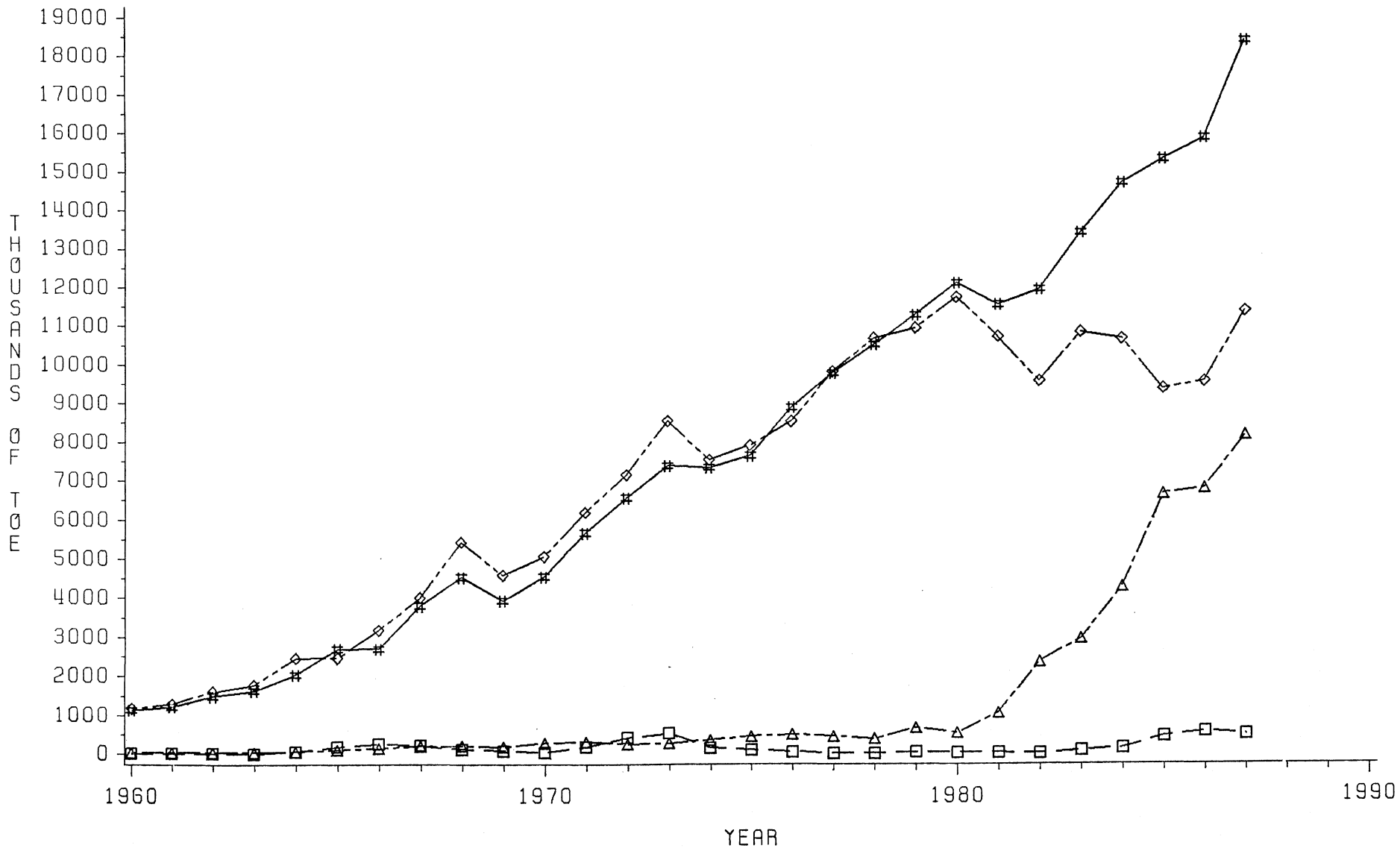


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

THAILAND

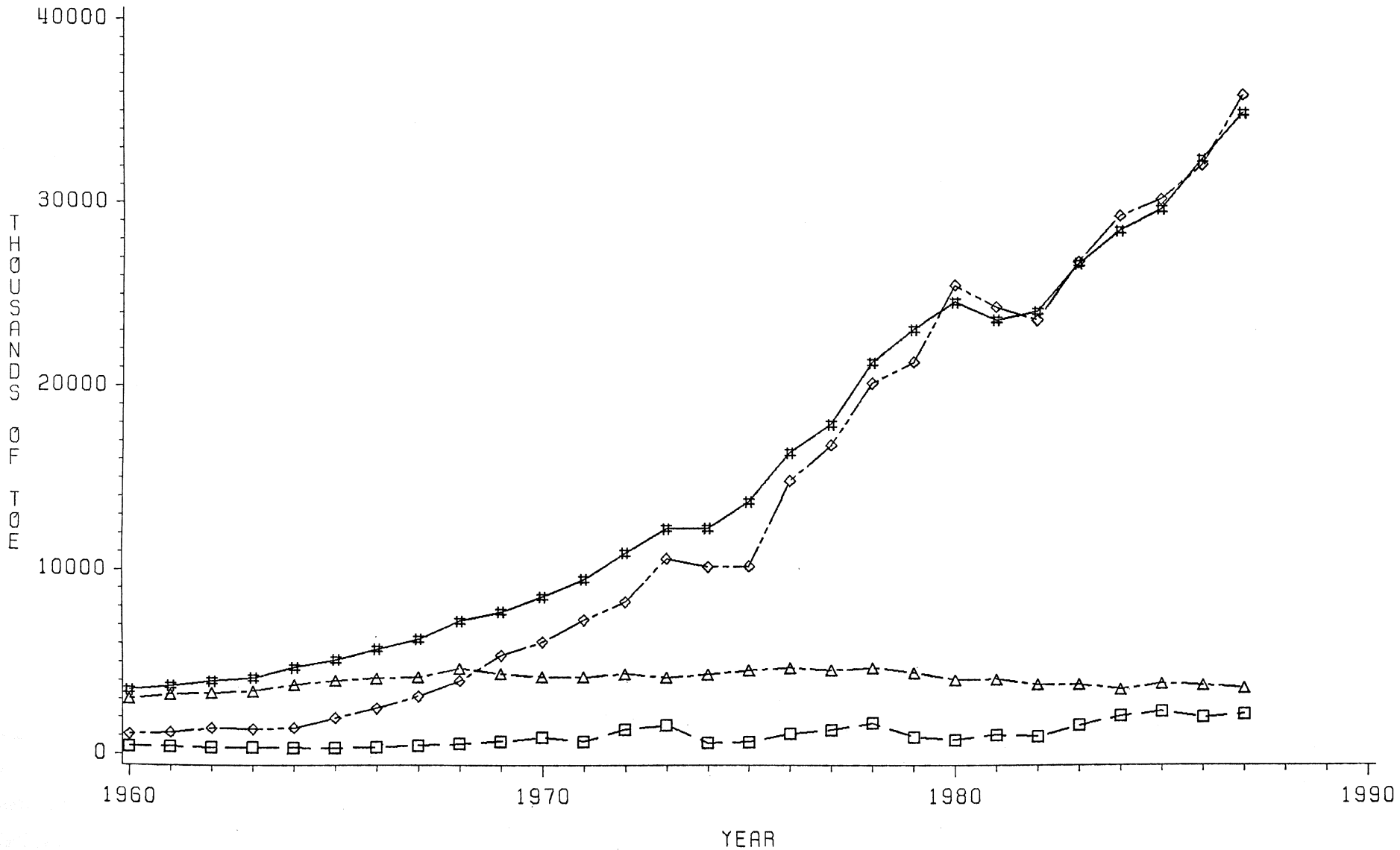


ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

ENERGY CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

TAIWAN



ENERGY CONSUMPTION ------HASH ENERGY PRODUCTION----- TRIANGLE

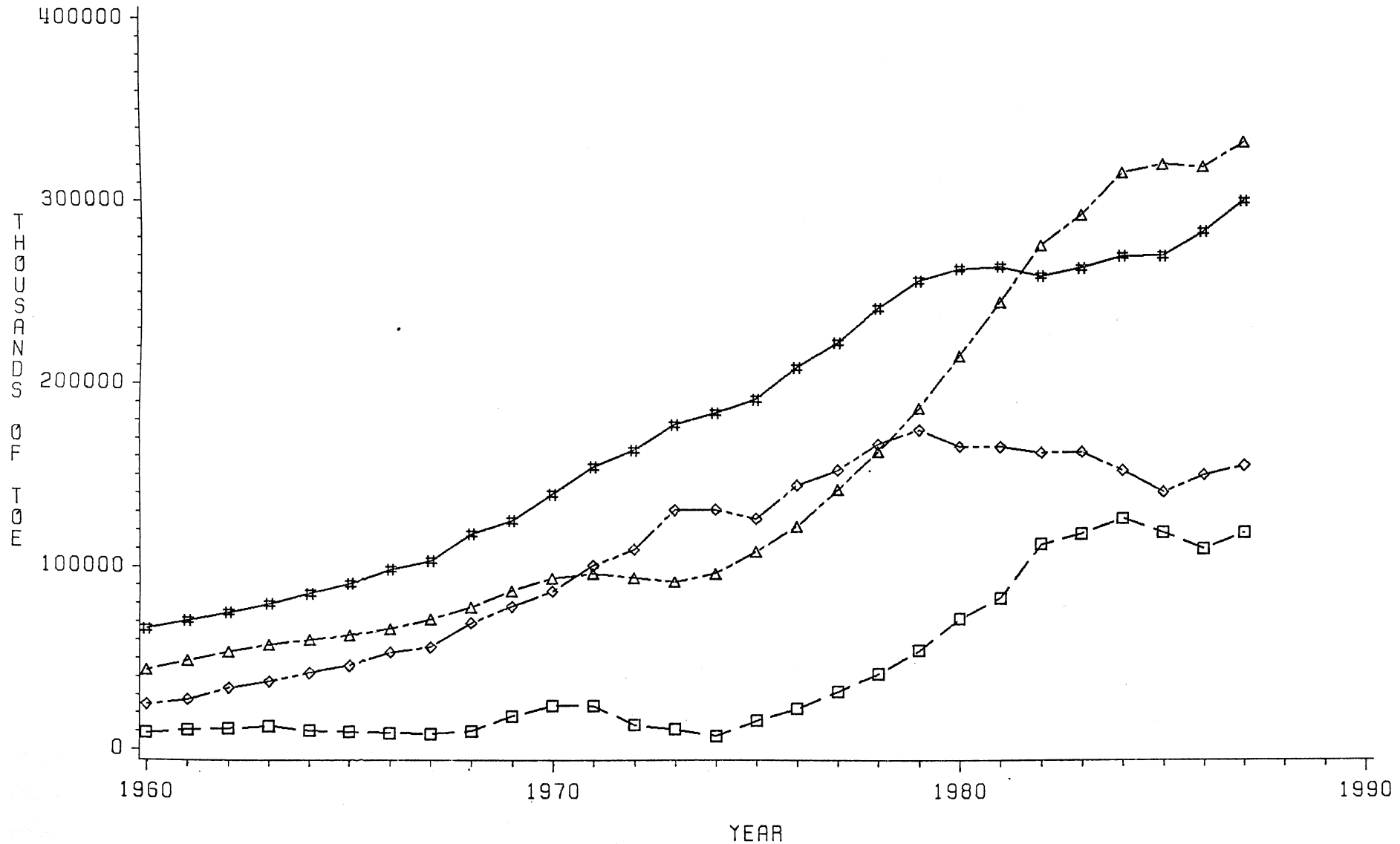
ENERGY IMPORT ----- DIAMAND ENERGY EXPORT ----- SQUARE

APPENDIX B

Primary Oil Consumption, Production, Import and Export

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

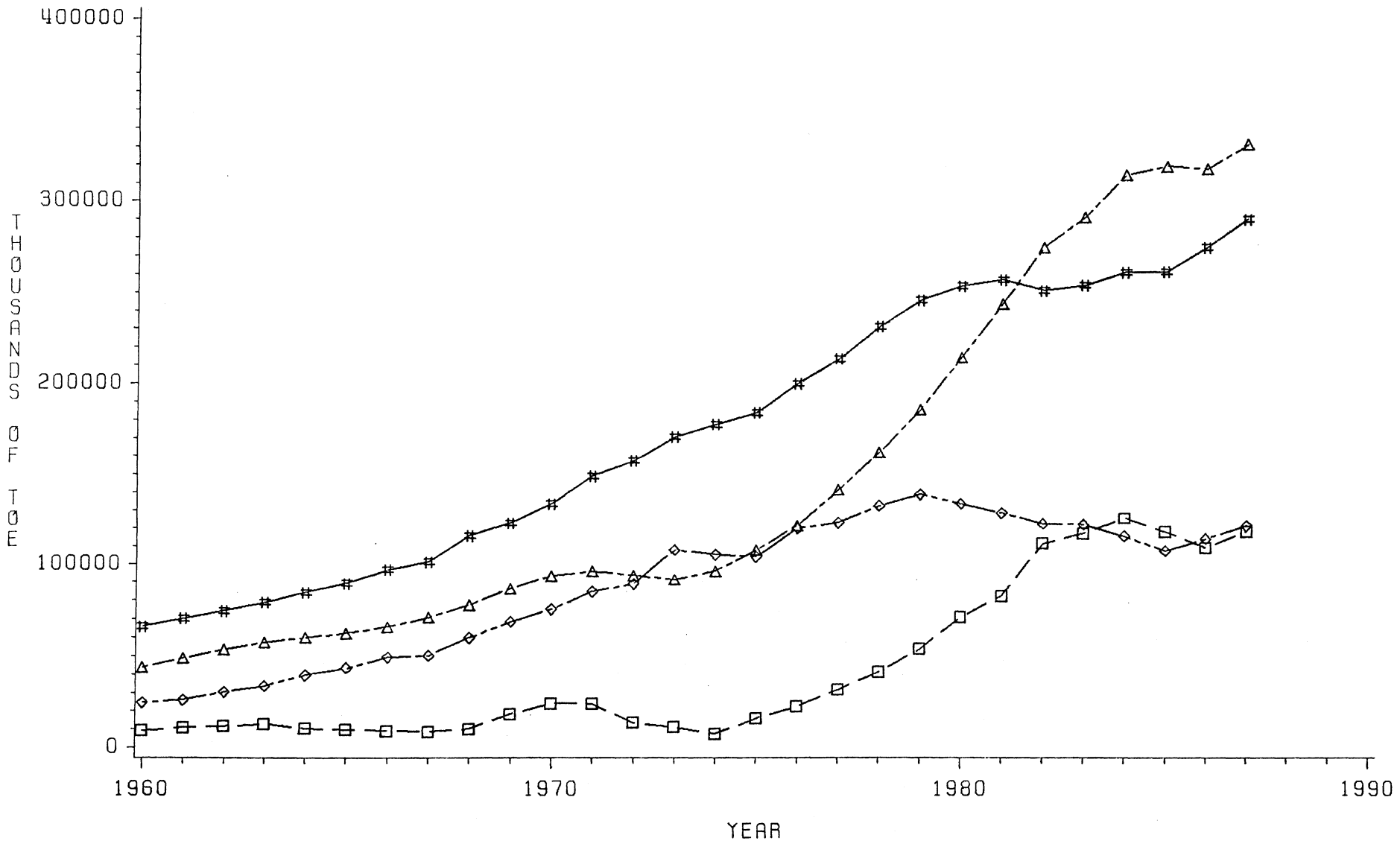
15 LOCS



35

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

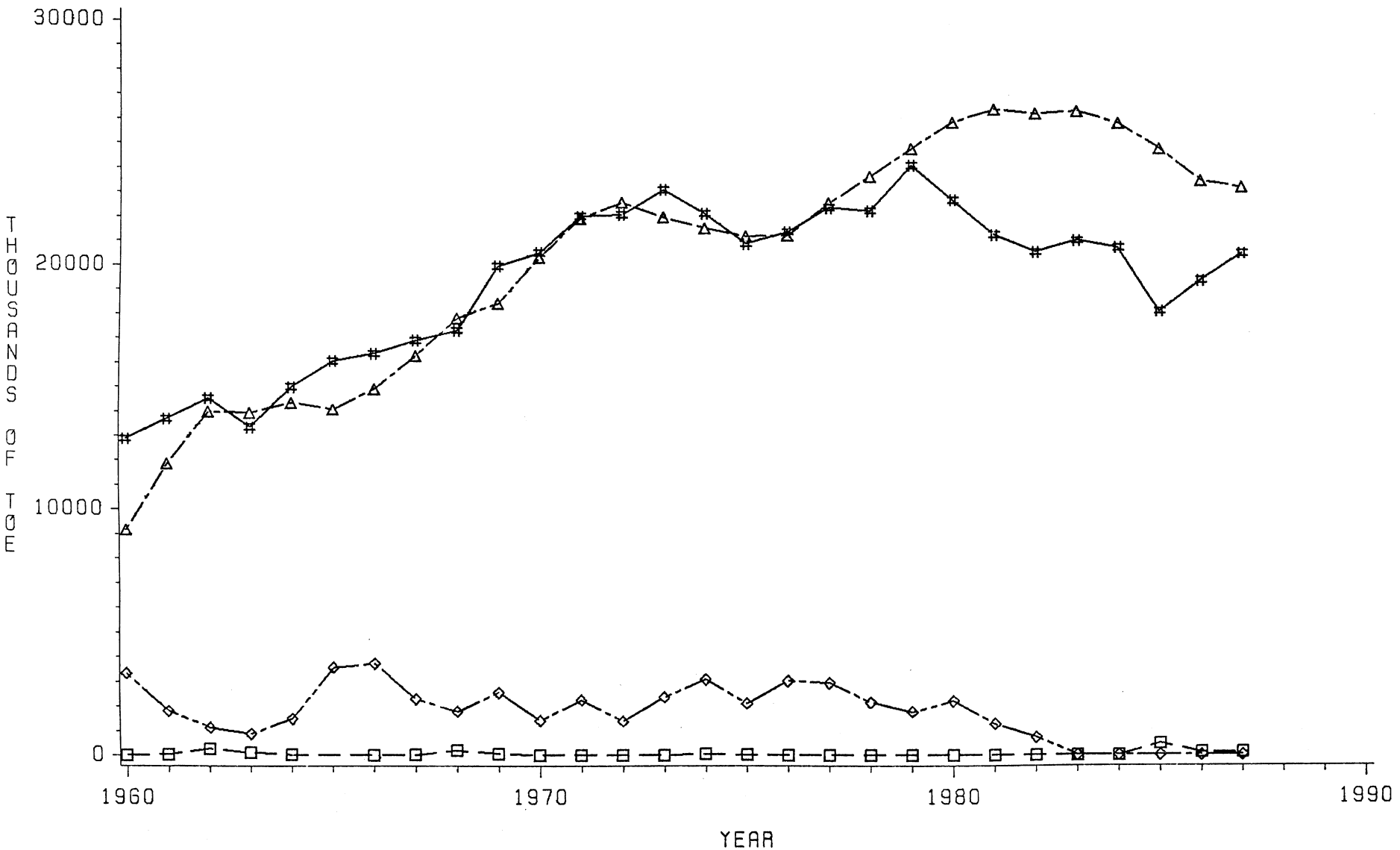
14 LDCS



36

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

ARGENTINA



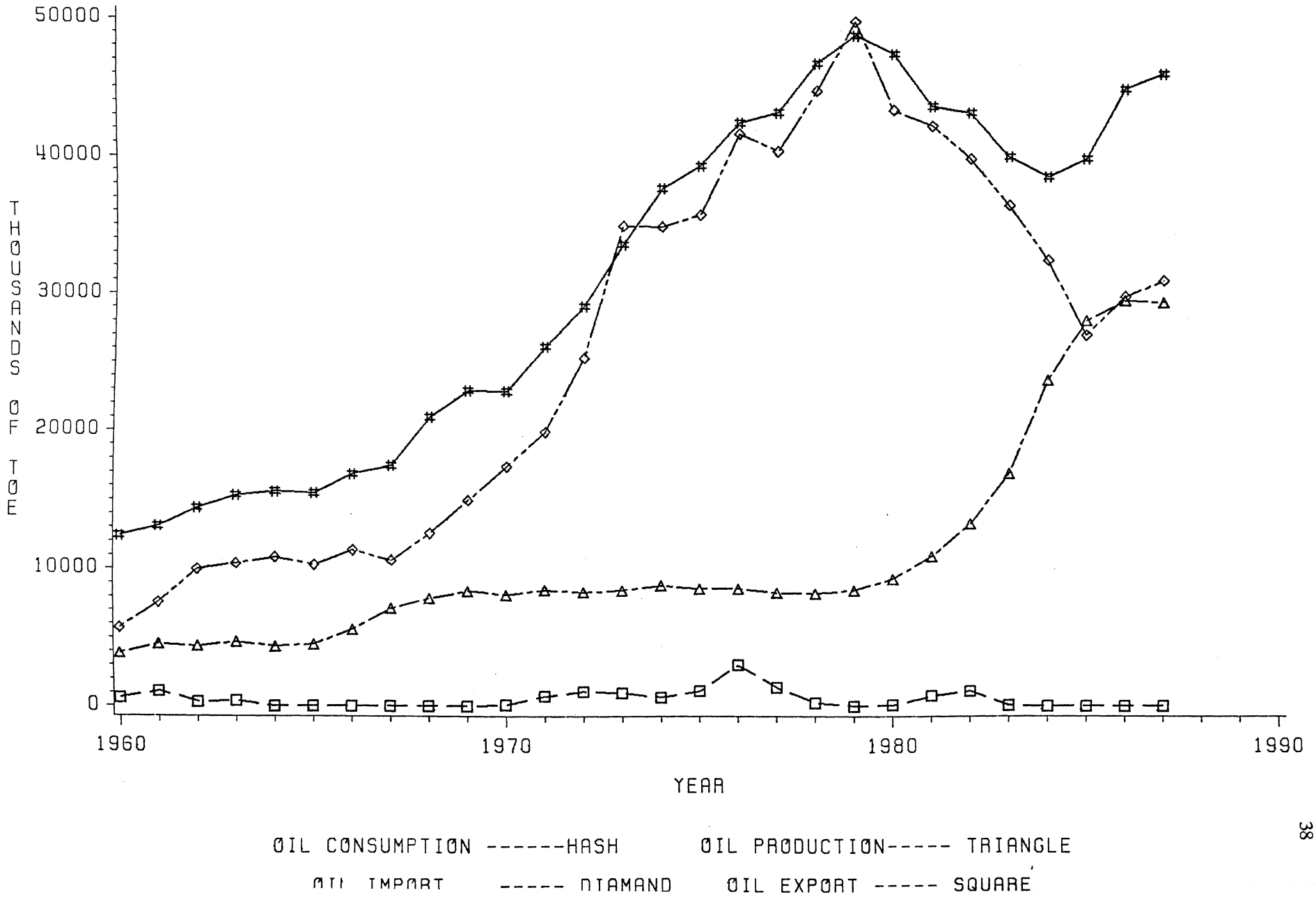
OIL CONSUMPTION ------HASH OIL PRODUCTION----- TRIANGLE

OIL IMPORT ----- DIAMAND OIL EXPORT ----- SQUARE

37

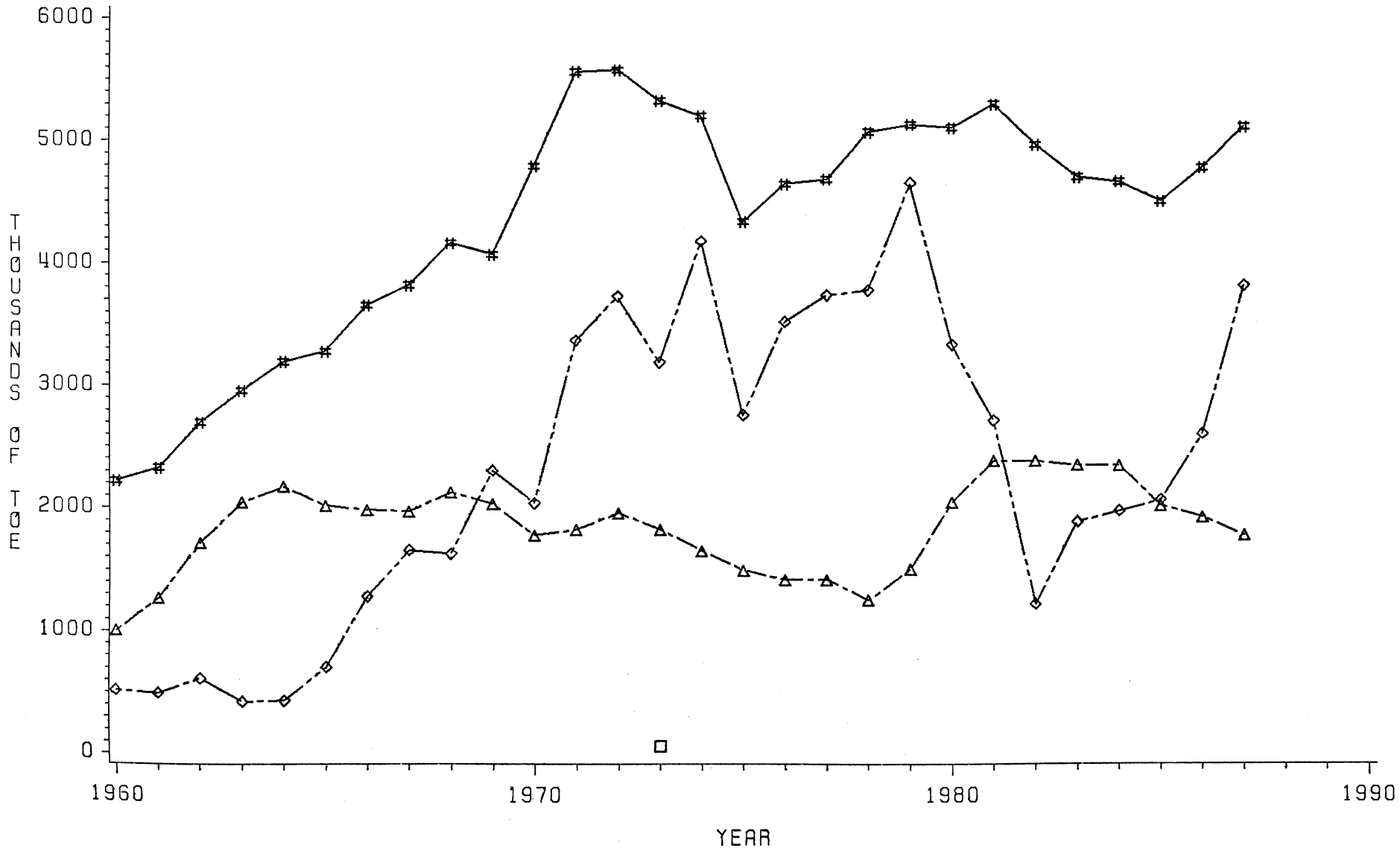
OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

BRAZIL



OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

CHILE



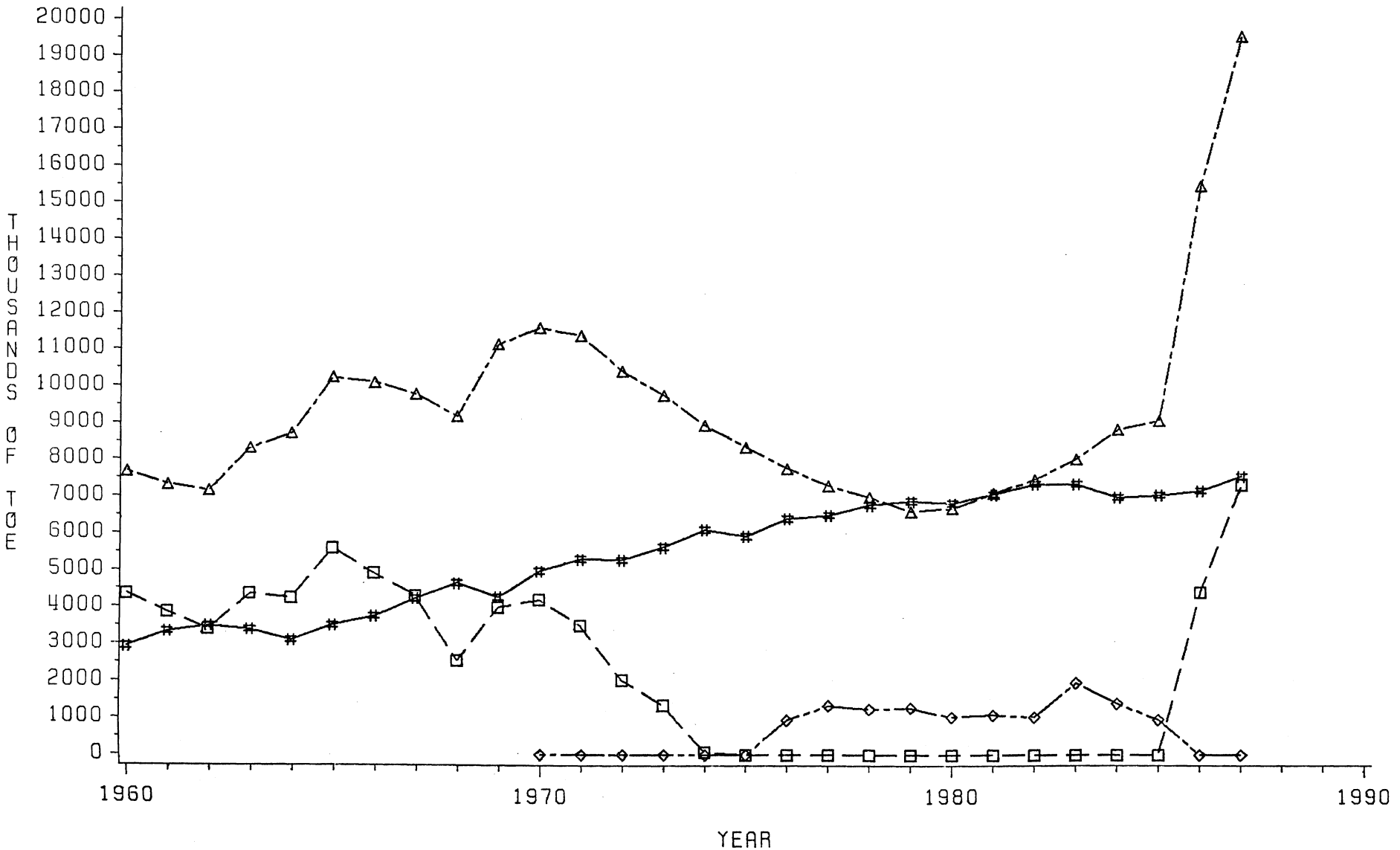
OIL CONSUMPTION ------HASH OIL PRODUCTION----- TRIANGLE

OIL IMPORT ----- DIAMAND OIL EXPORT ----- SQUARE

39

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

COLOMBIA

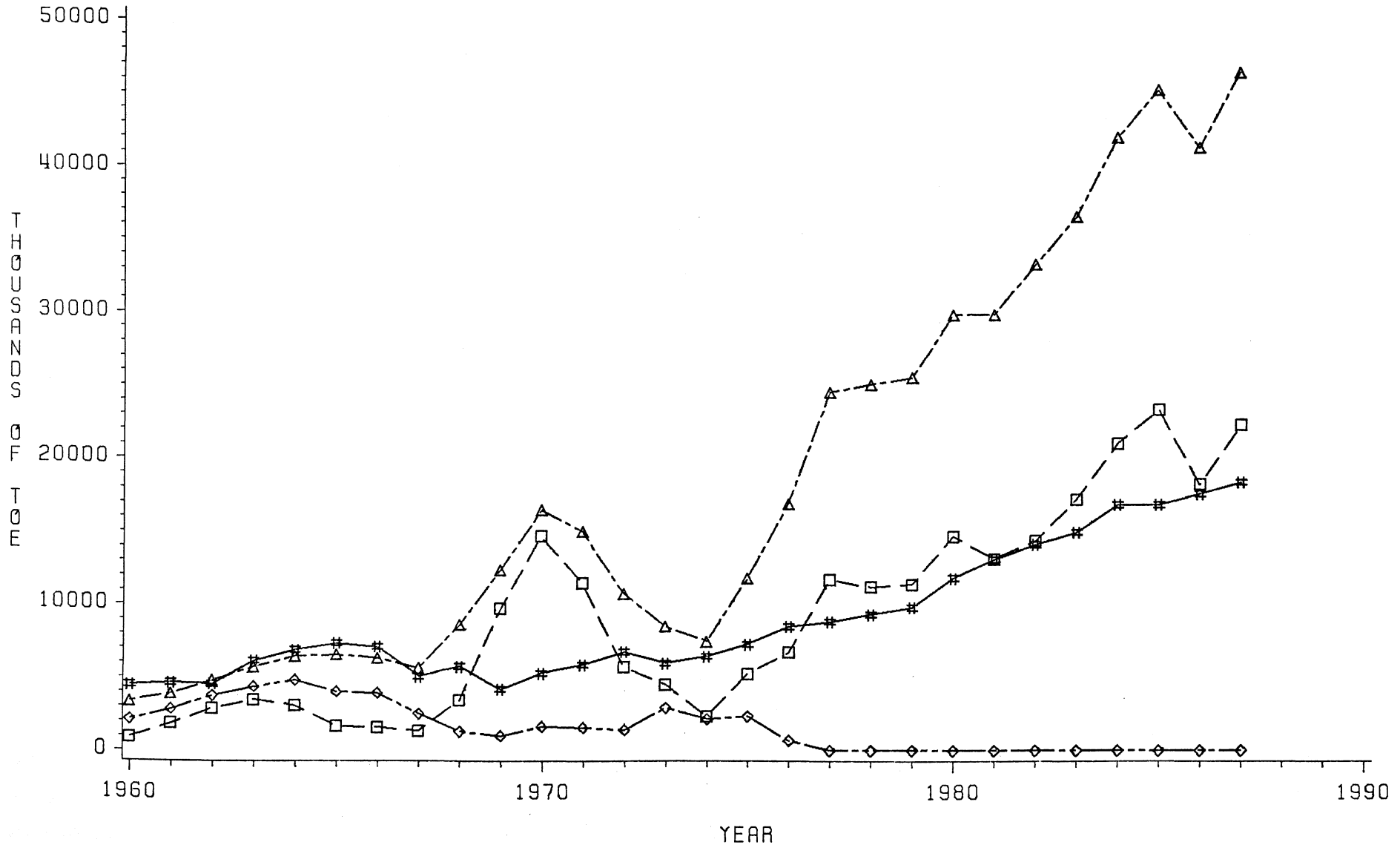


OIL CONSUMPTION ------HASH OIL PRODUCTION----- TRIANGLE

OIL IMPORT ----- DIAMAND OIL EXPORT ----- SQUARE

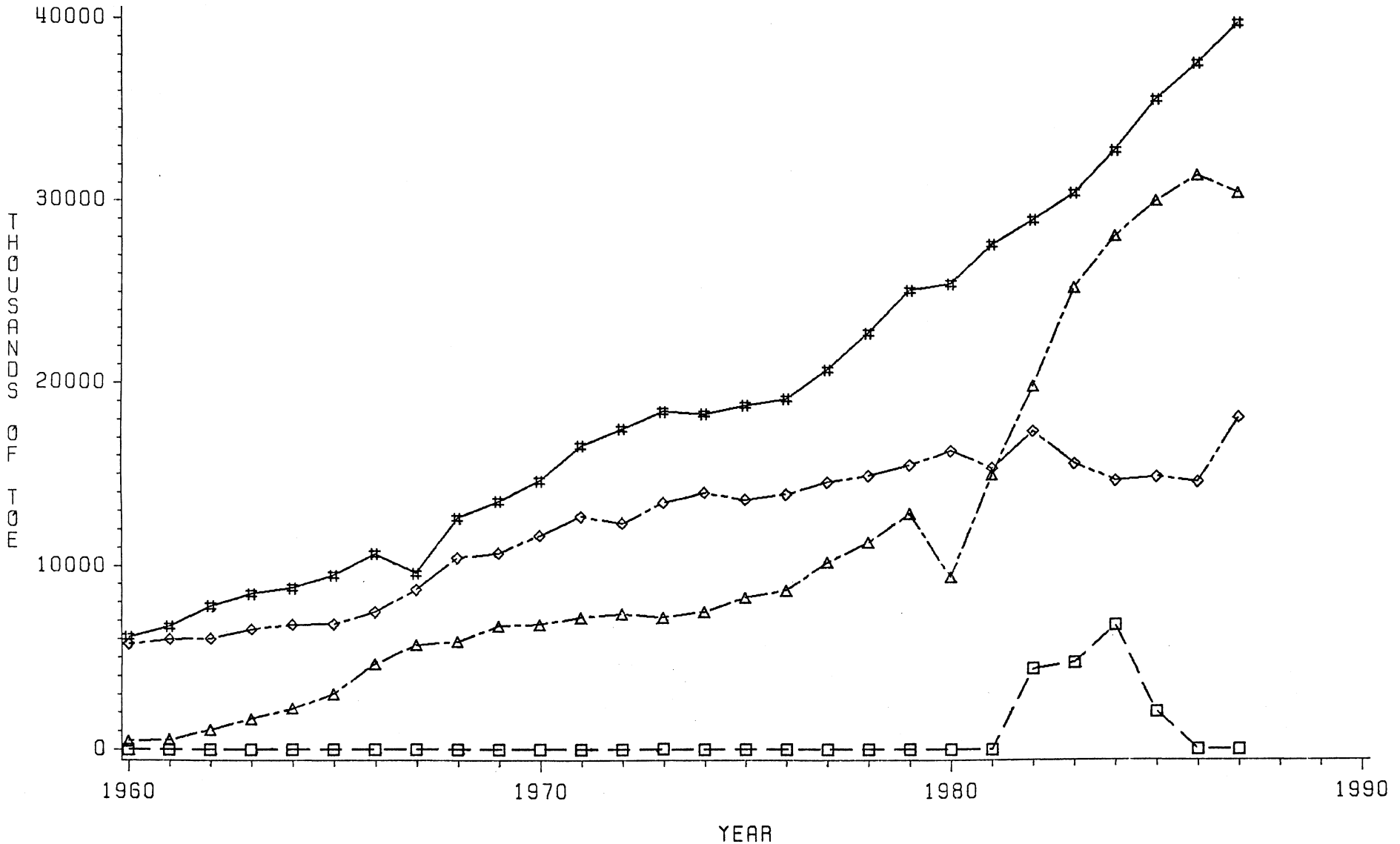
OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

EGYPT



OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

INDIA

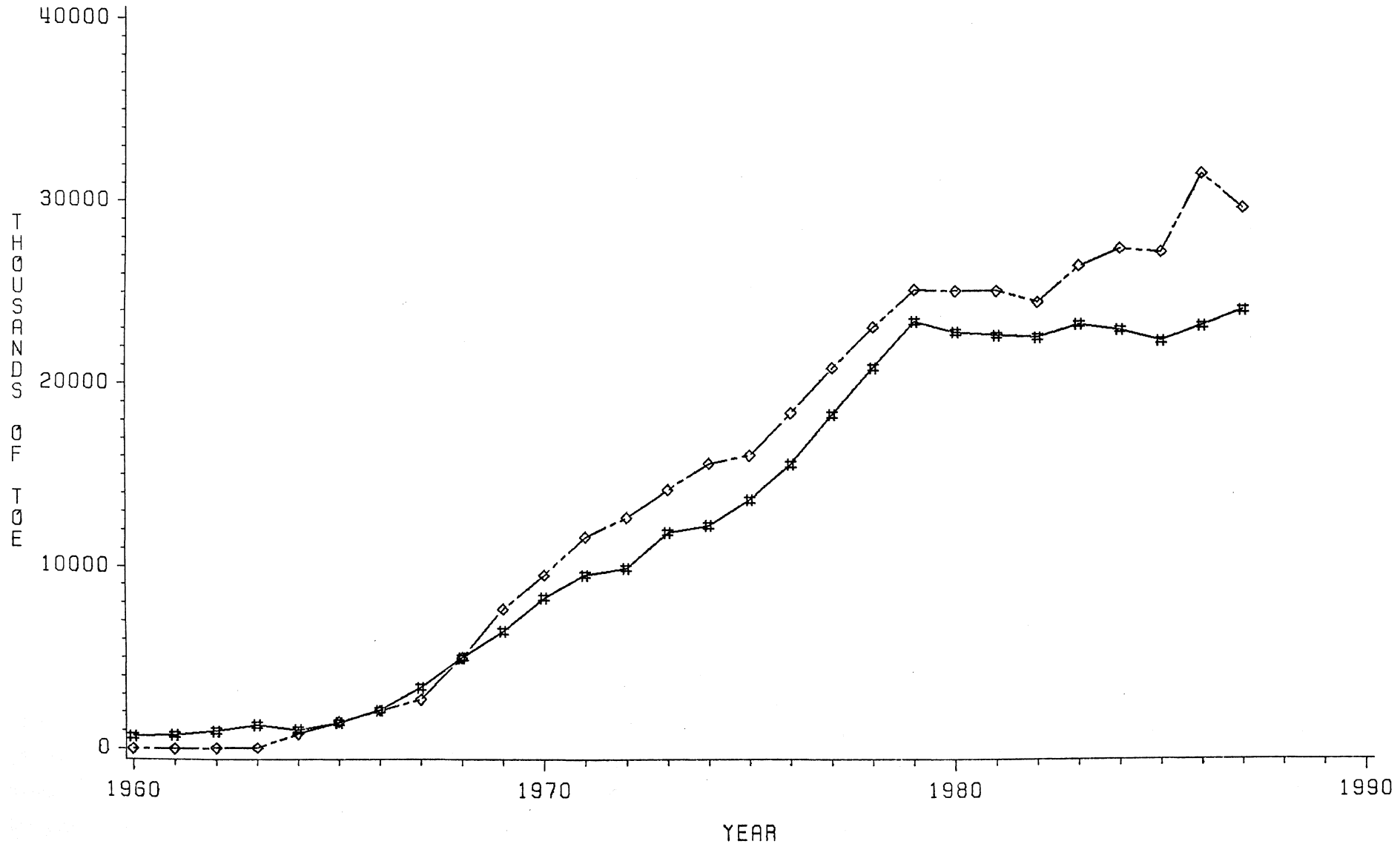


OIL CONSUMPTION ------HASH OIL PRODUCTION----- TRIANGLE

OIL IMPORT ----- DIAMAND OIL EXPORT ----- SQUARE

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

KOREA

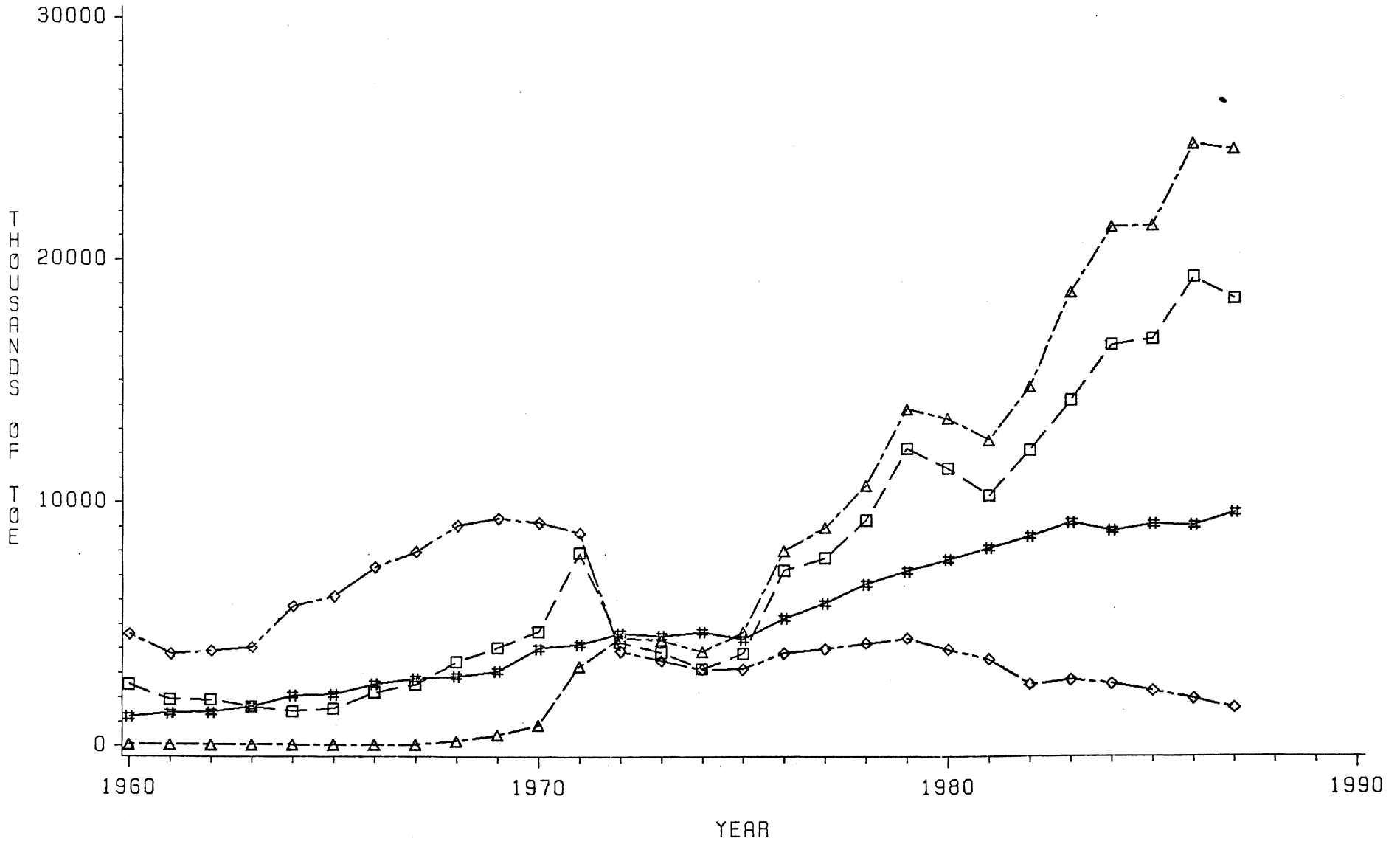


OIL CONSUMPTION ------HASH OIL PRODUCTION----- TRIANGLE

OIL IMPORT ----- DIAMAND OIL EXPORT ----- SQUARE

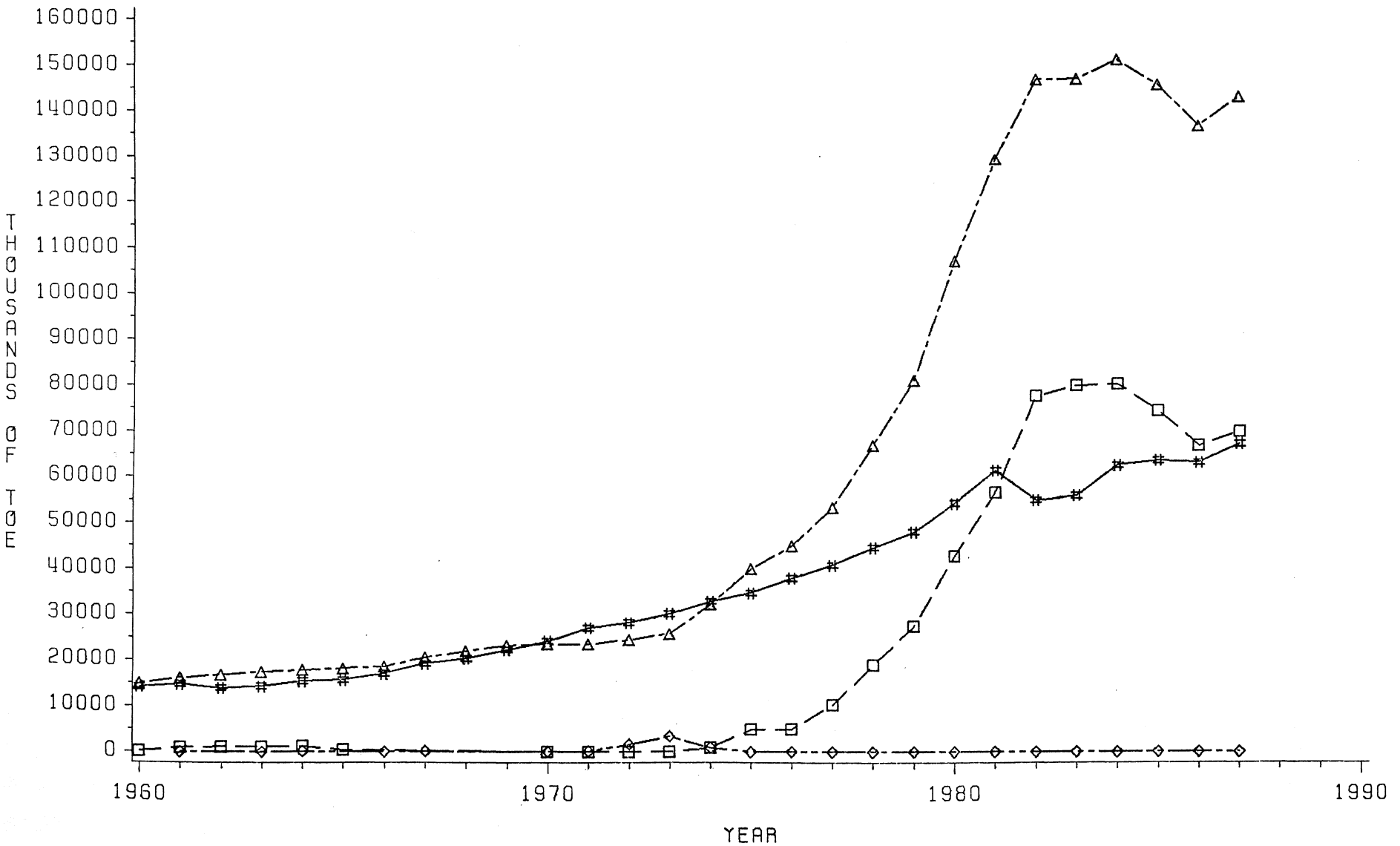
OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

MALAYSIA



OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

MEXICO

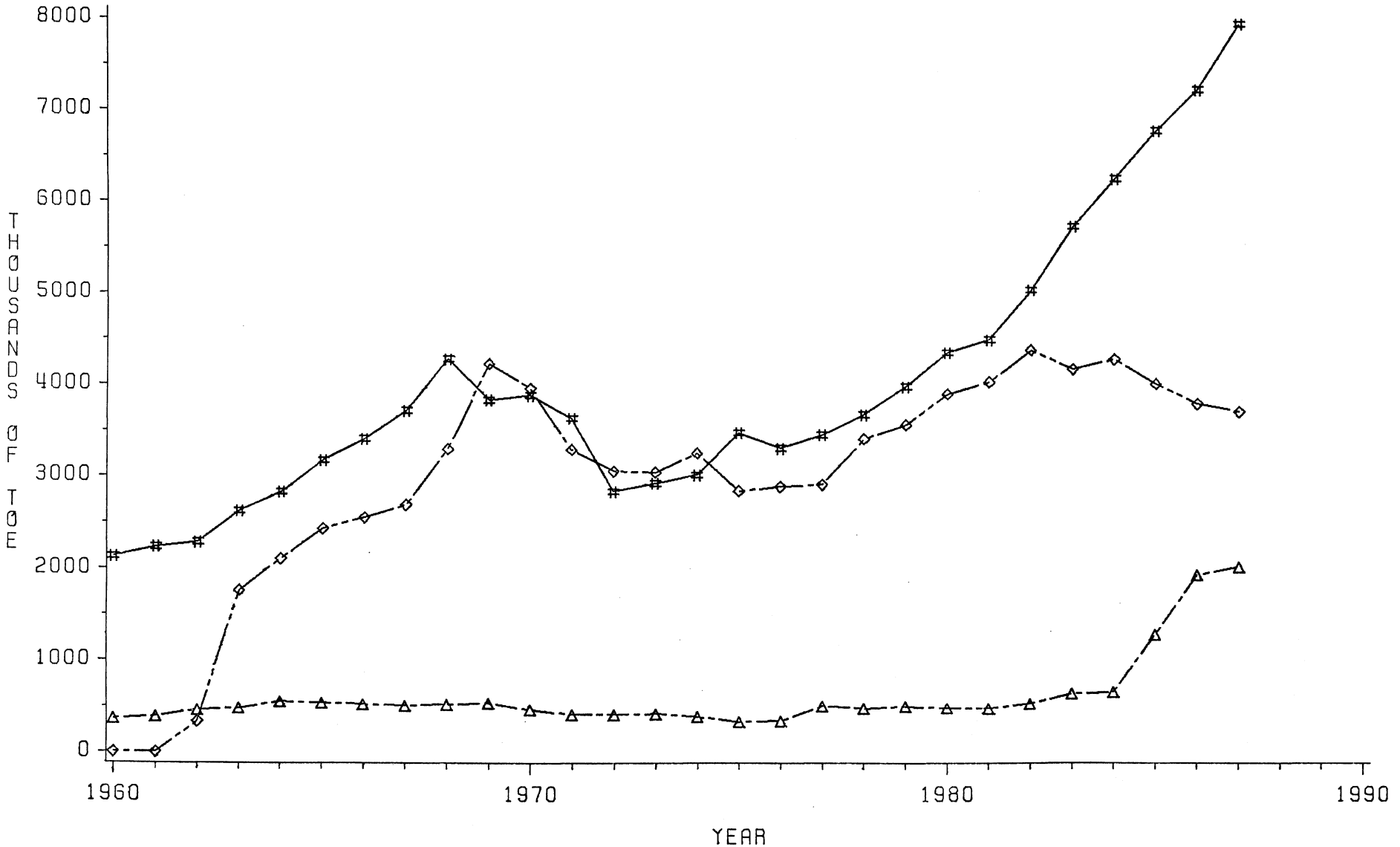


OIL CONSUMPTION ------HASH OIL PRODUCTION----- TRIANGLE

OIL IMPORT ----- DIAMAND OIL EXPORT ----- SQUARE

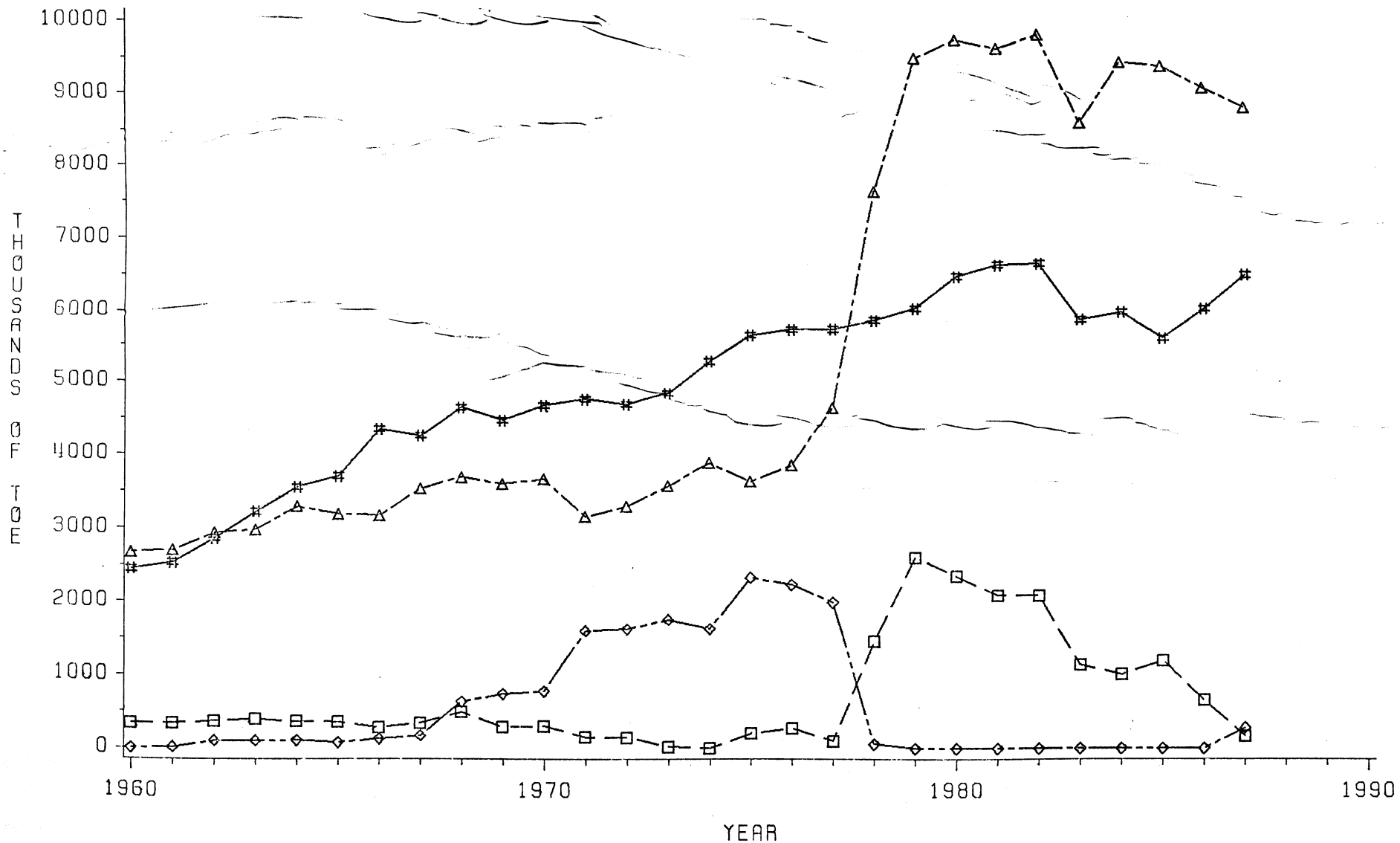
OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

PAKISTAN



OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

PERU

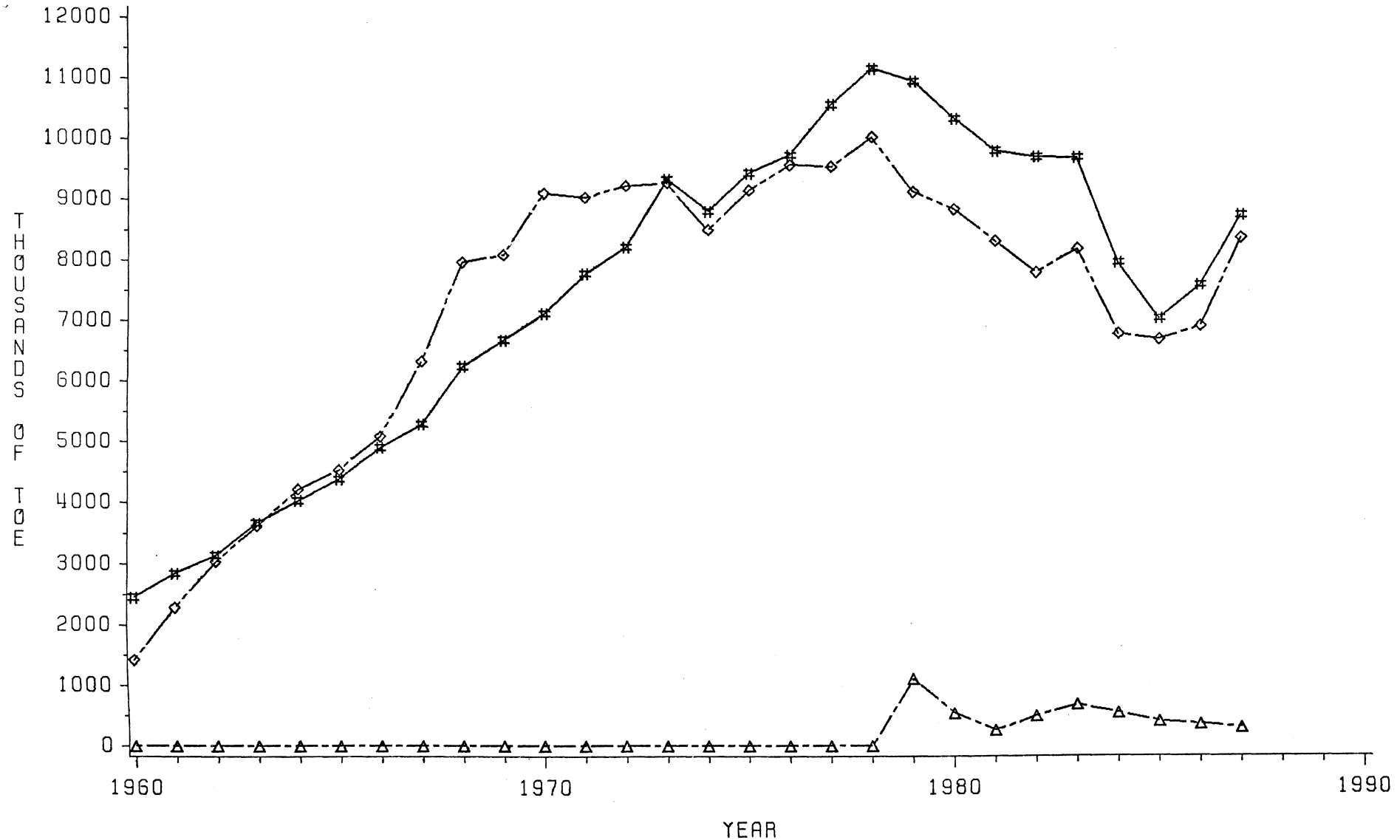


ØIL CØNSUMPTIØN ------HASH ØIL PRØDUCTIØN----- TRIANGLE

ØIL IMPØRT ----- DIAMAND ØIL EXPØRT ----- SQUARE

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

PHILIPPINES

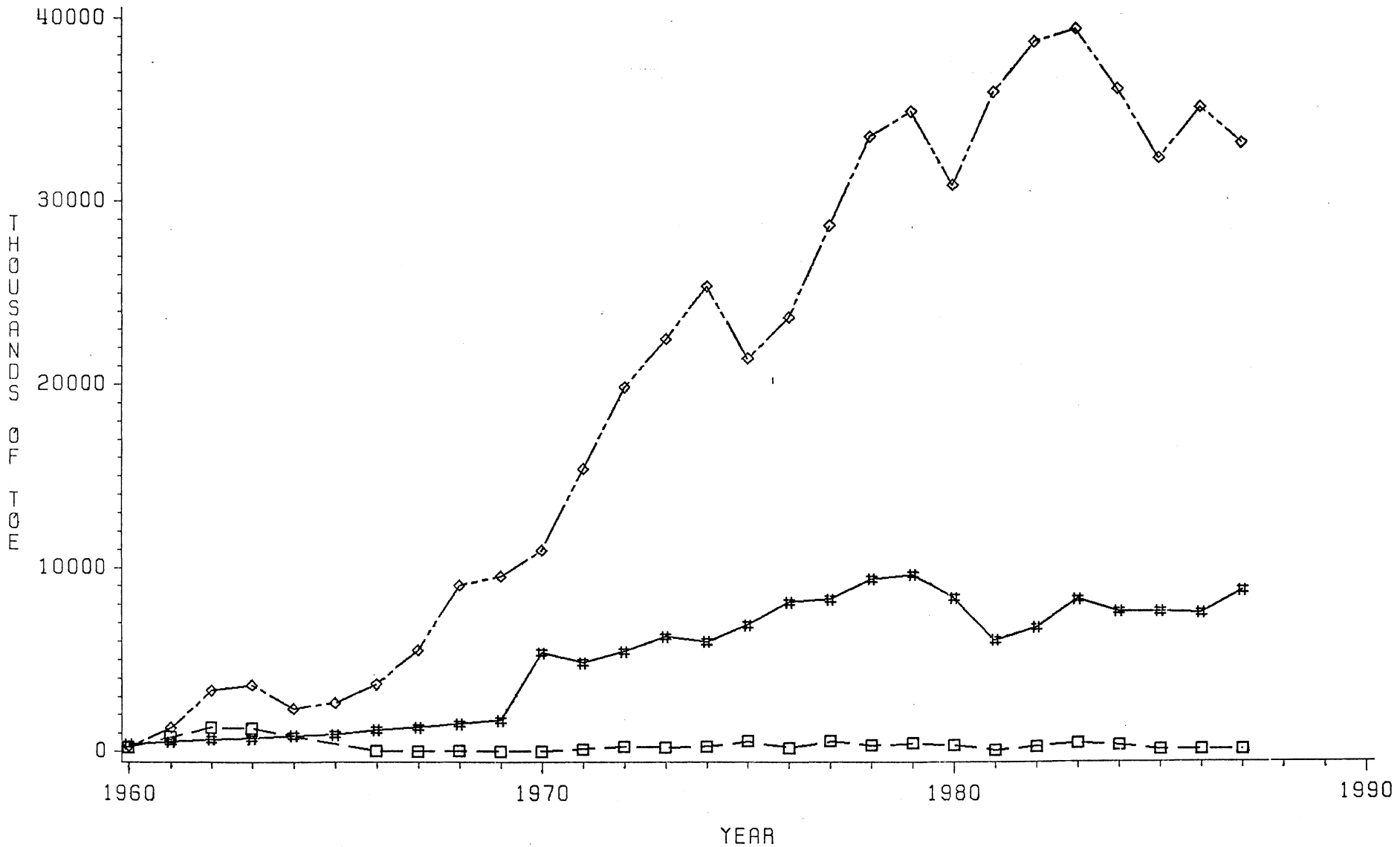


ØIL CØNSUMPTIØN ------HASH ØIL PRØDUCTIØN----- TRIANGLE

ØIL IMPØRT ----- DIAMAND ØIL EXPØRT ----- SQUARE

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

SINGAPORE

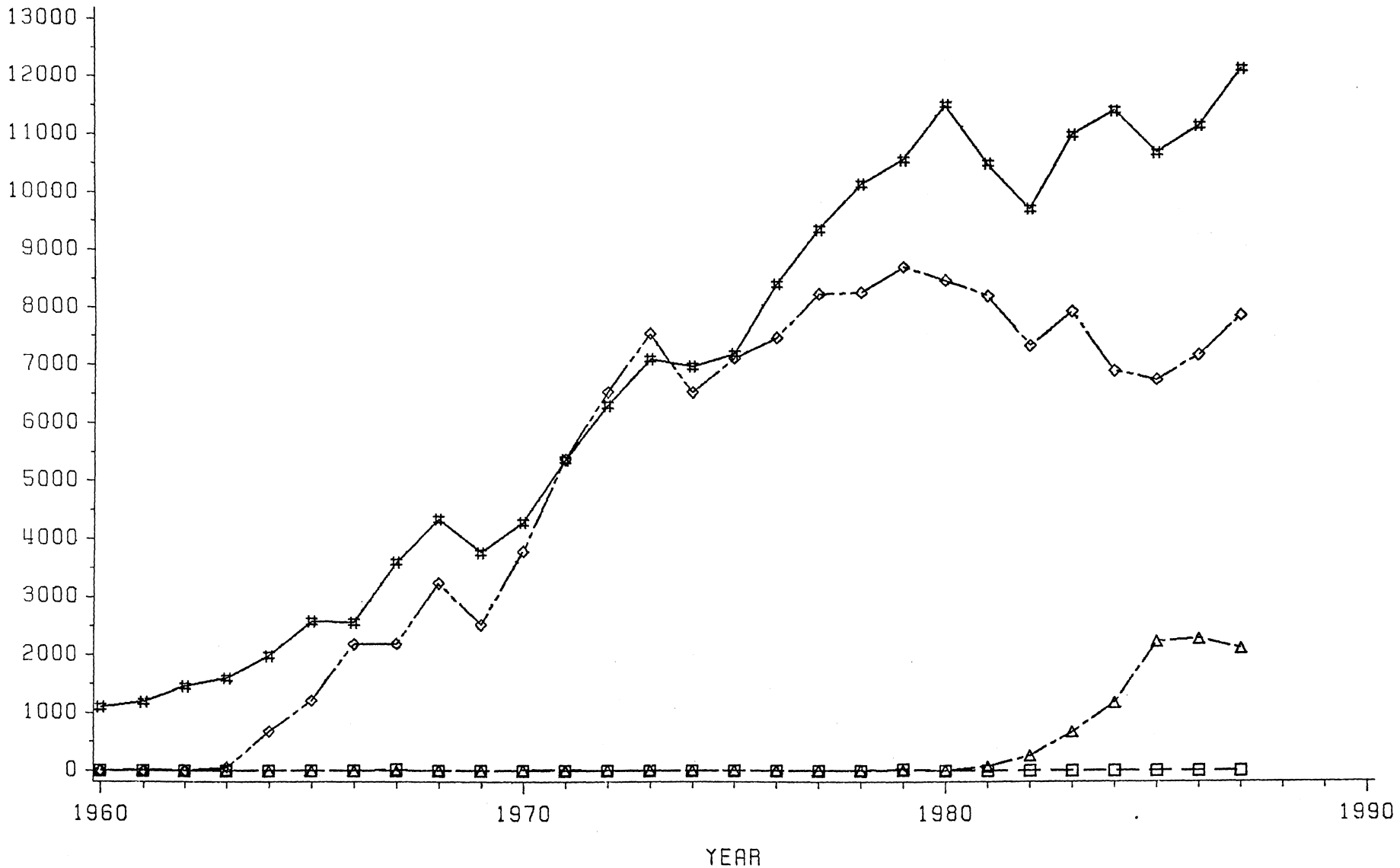


OIL CONSUMPTION ------HASH OIL PRODUCTION----- TRIANGLE

OIL IMPORT ----- DIAMAND OIL EXPORT ----- SQUARE

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

THAILAND

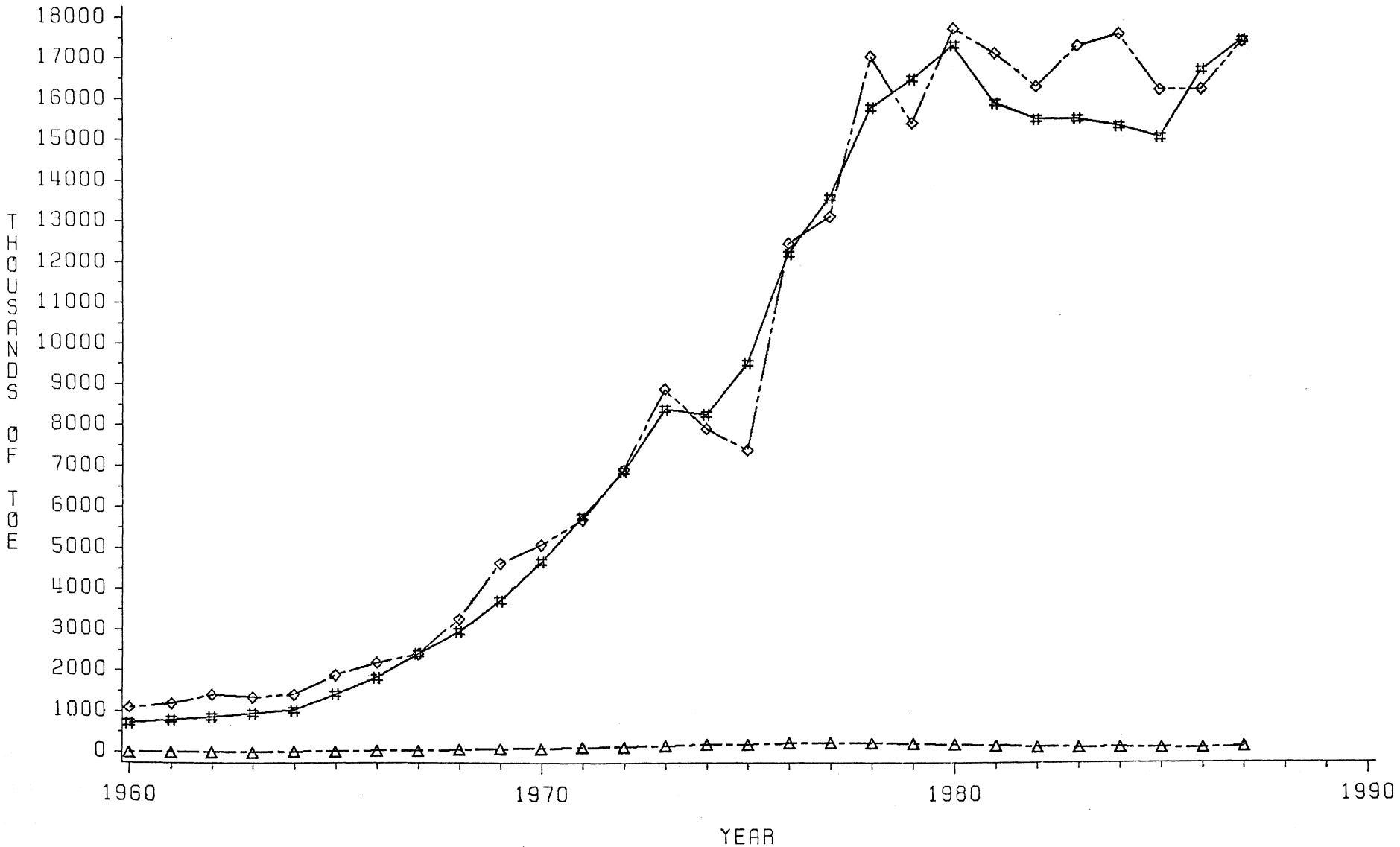


ØIL CØNSUMPTIØN ------HASH ØIL PRØDUCTIØN----- TRIANGLE

ØIL IMPØRT ----- DIAMAND ØIL EXPØRT ----- SQUARE

OIL CONSUMPTION, PROCDUCTION, IMPORT, EXPORT

TAIWAN



ØIL CONSUMPTION ------HASH ØIL PRODUCTION----- TRIANGLE

ØIL IMPORT ----- DIAMAND ØIL EXPORT ----- SQUARE

J1

APPENDIX C

Energy/GDP Ratio and Oil/GDP Ratio

ENERGY/GDP AND OIL/GDP

ARGENTINA

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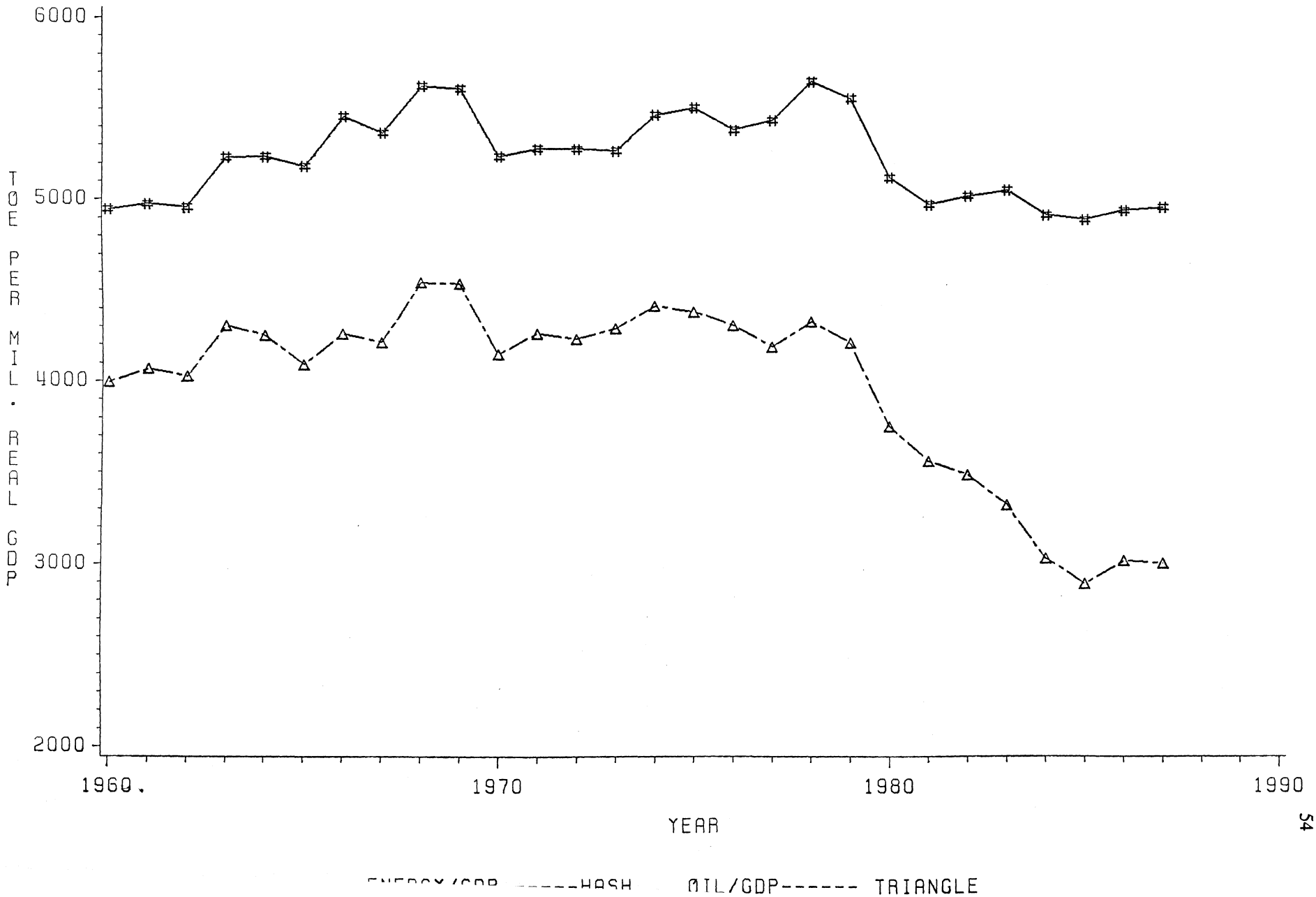
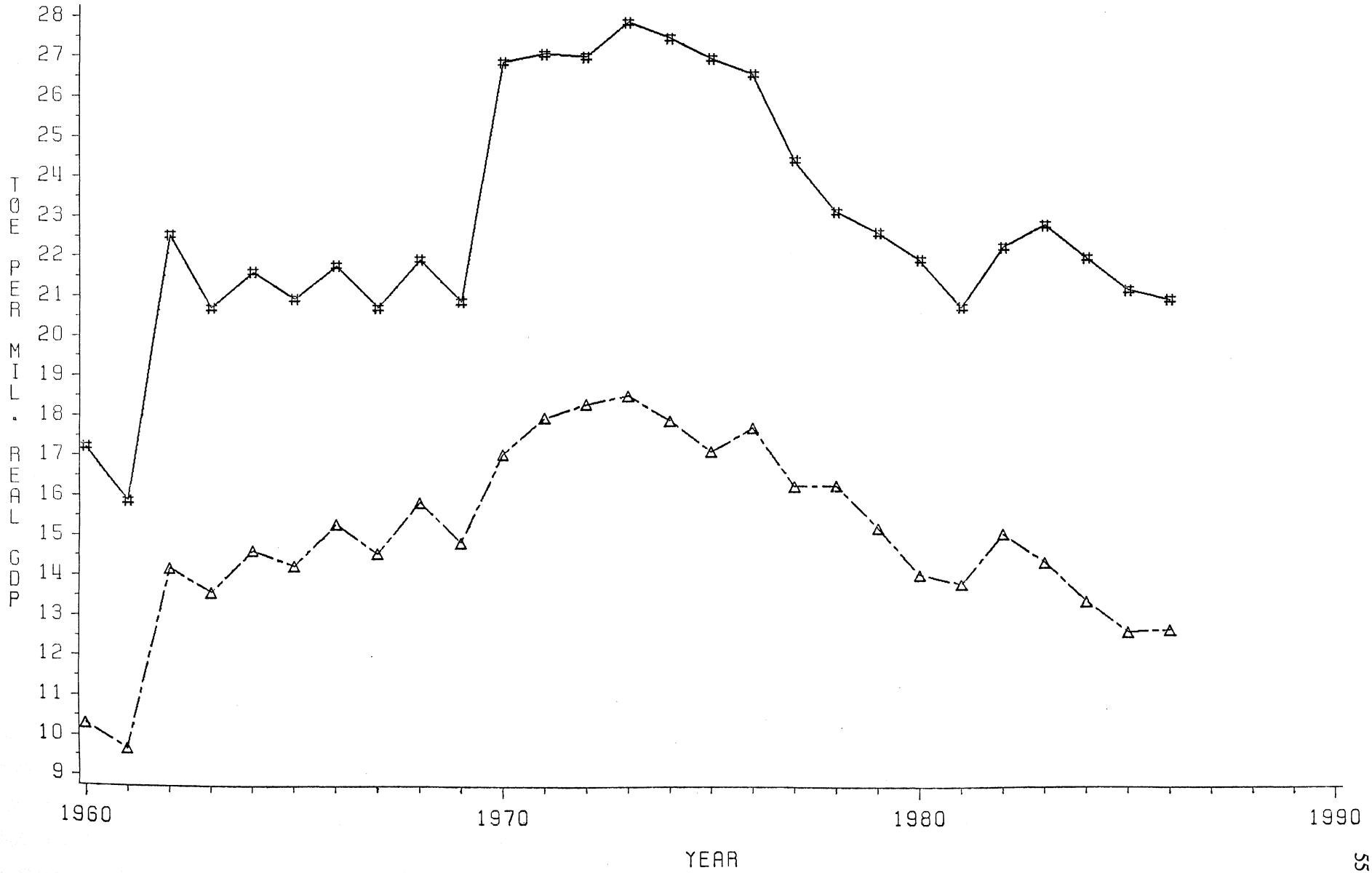
ENERGY/GDP AND OIL/GDP

BRAZIL



ENERGY/GDP AND OIL/GDP

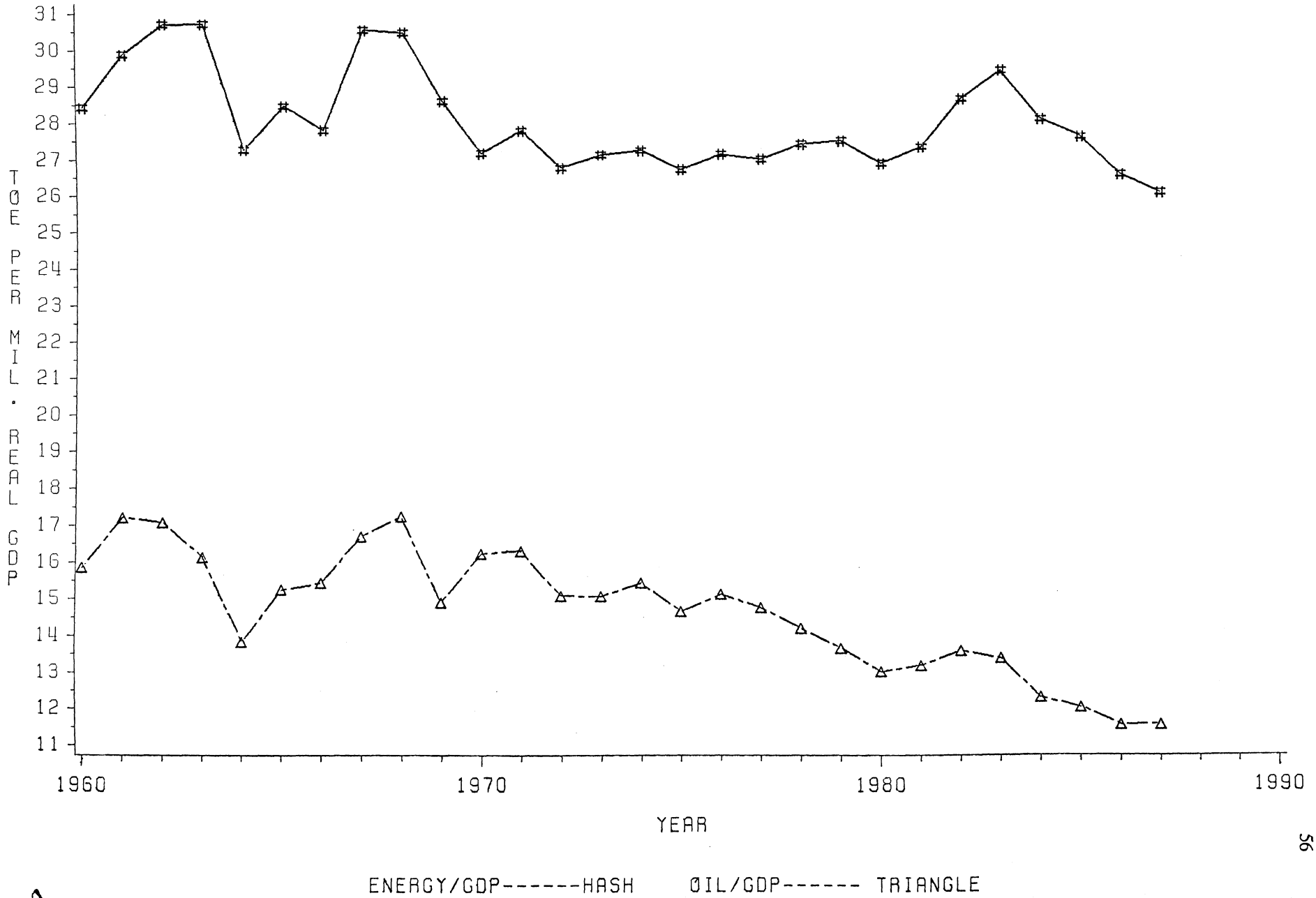
CHILE



ENERGY/GDP------HASH OIL/GDP------ TRIANGLE

ENERGY/GDP AND OIL/GDP

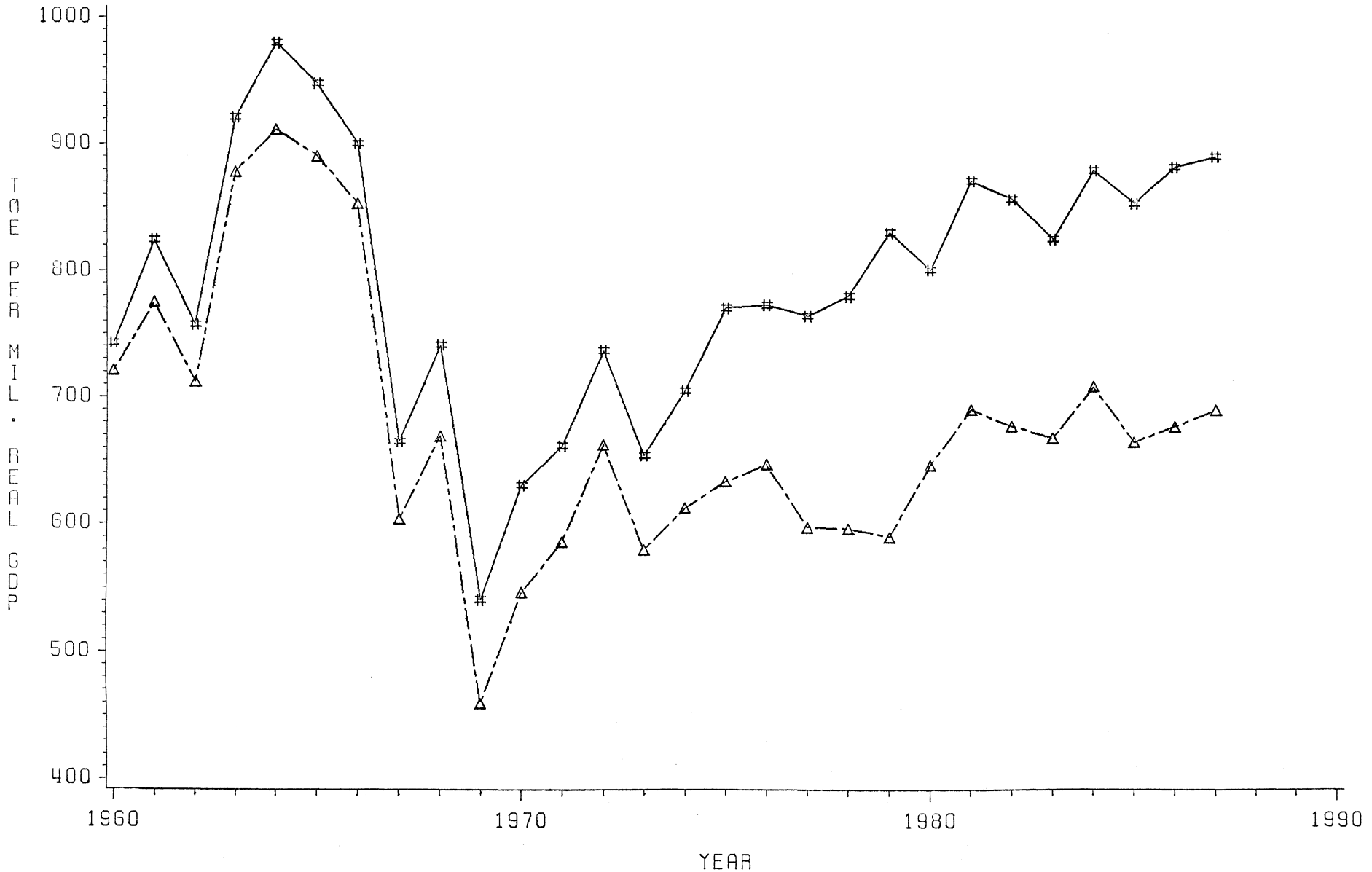
COLOMBIA



ENERGY/GDP------HASH OIL/GDP------ TRIANGLE

ENERGY/GDP AND OIL/GDP

EGYPT



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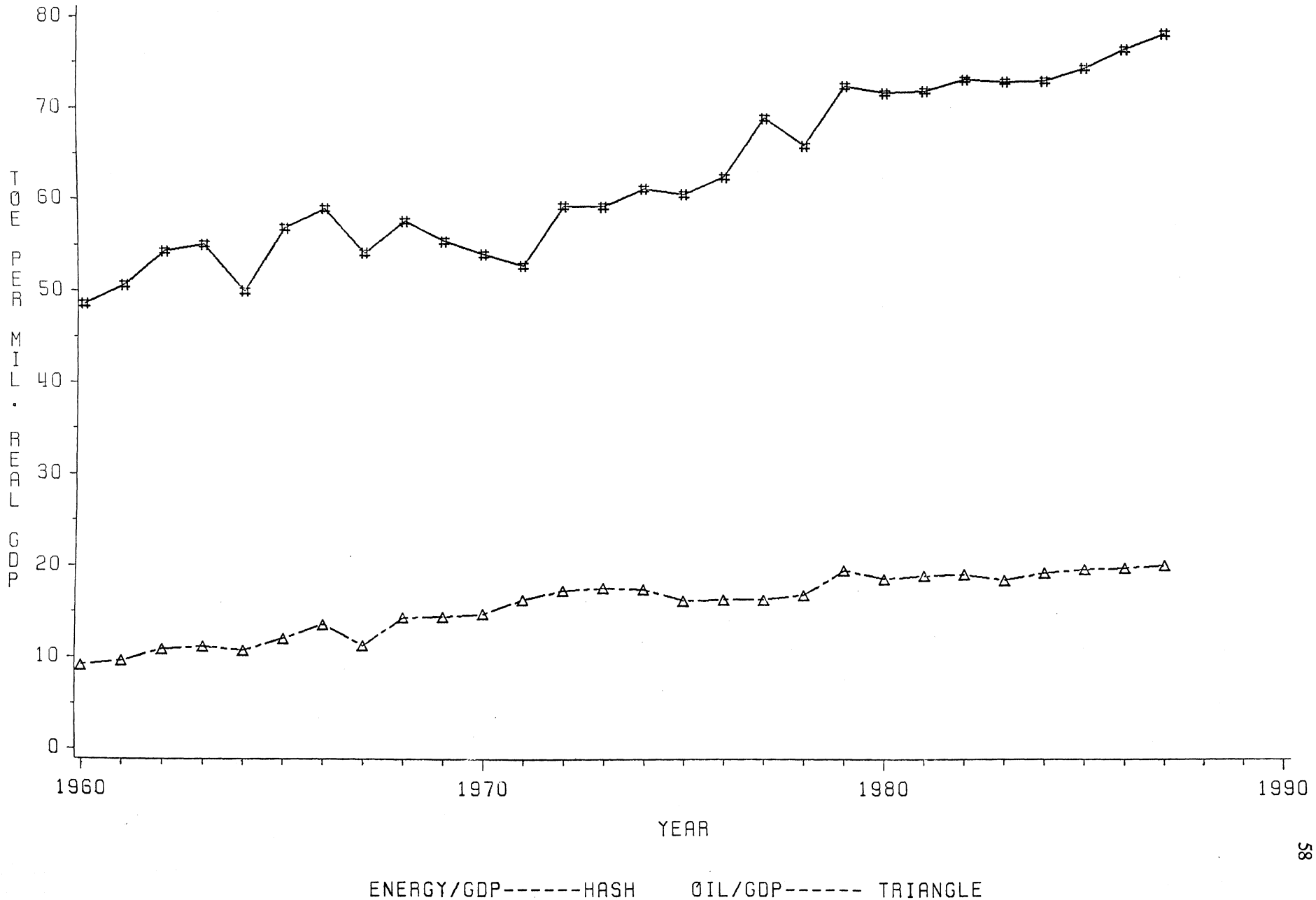
ENERGY/GDP AND OIL/GDP

INDIA



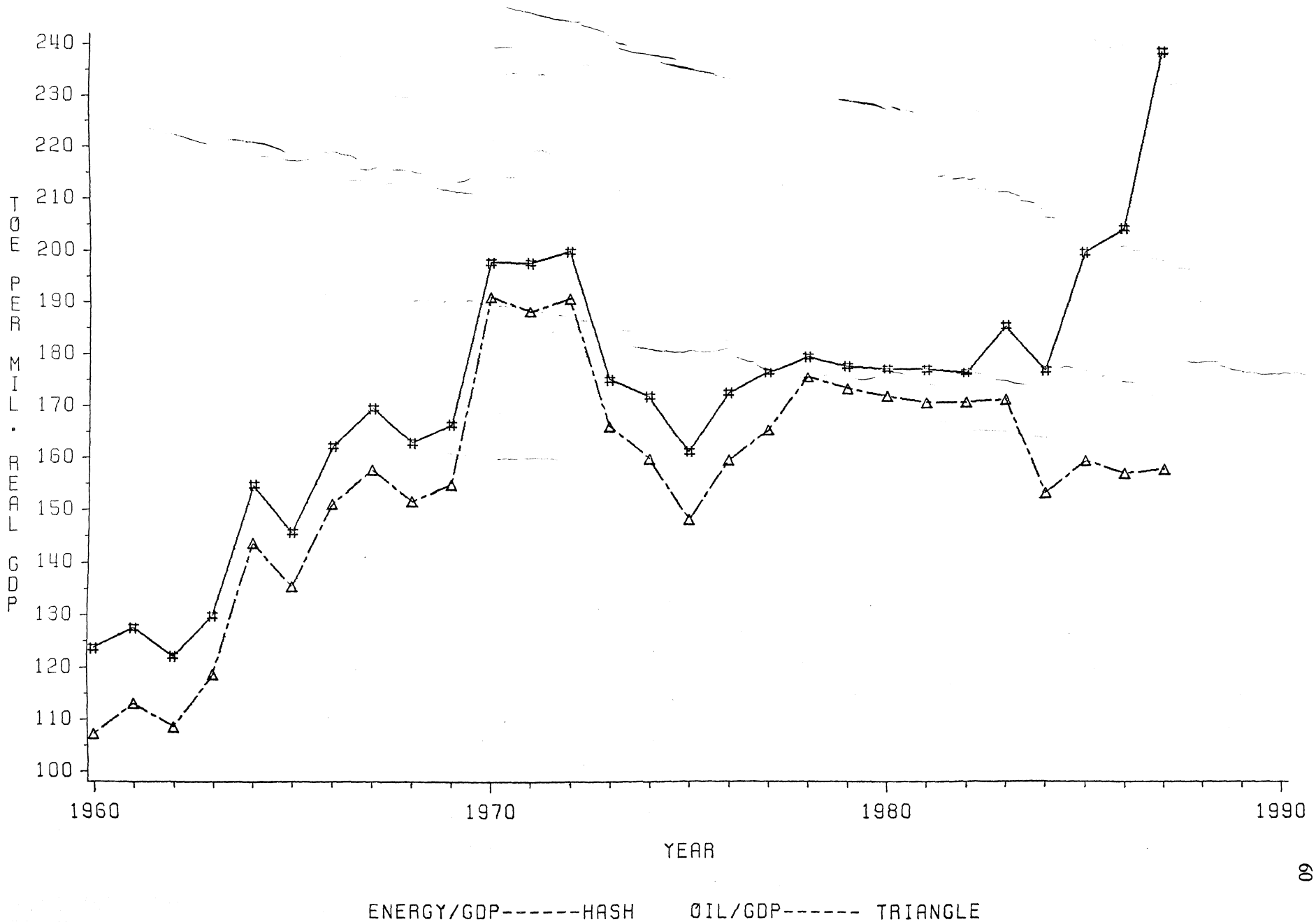
ENERGY/GDP AND OIL/GDP

KOREA

ENERGY/GDP------HASH OIL/GDP------ TRIANGLE

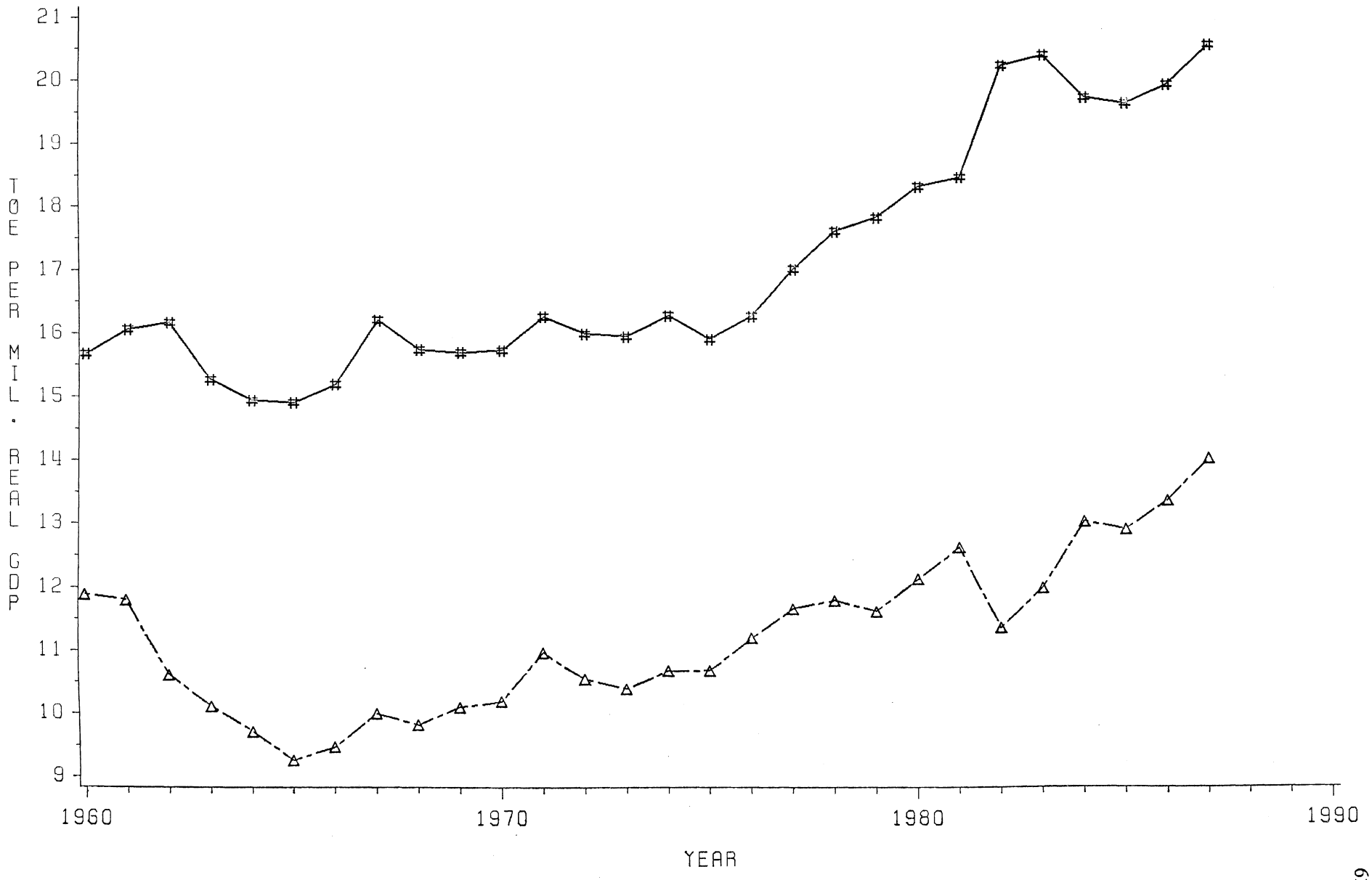
ENERGY/GDP AND OIL/GDP

MALAYSIA



ENERGY/GDP AND OIL/GDP

MEXICO



ENERGY/GDP------HASH OIL/GDP------ TRIANGLE

ENERGY/GDP AND OIL/GDP

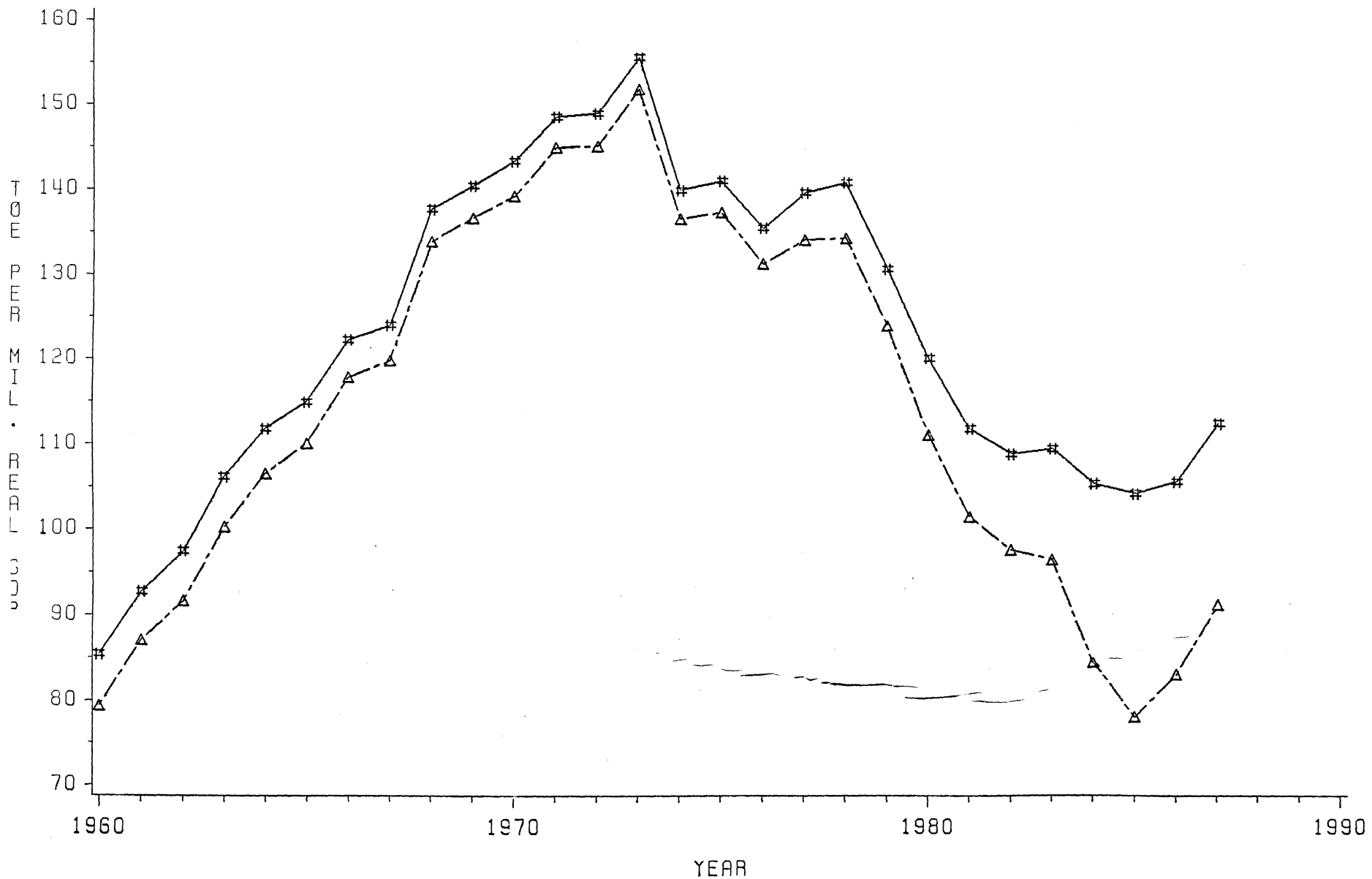
PAKISTAN

ENERGY/GDP AND OIL/GDP

PERU

ENERGY/GDP AND OIL/GDP

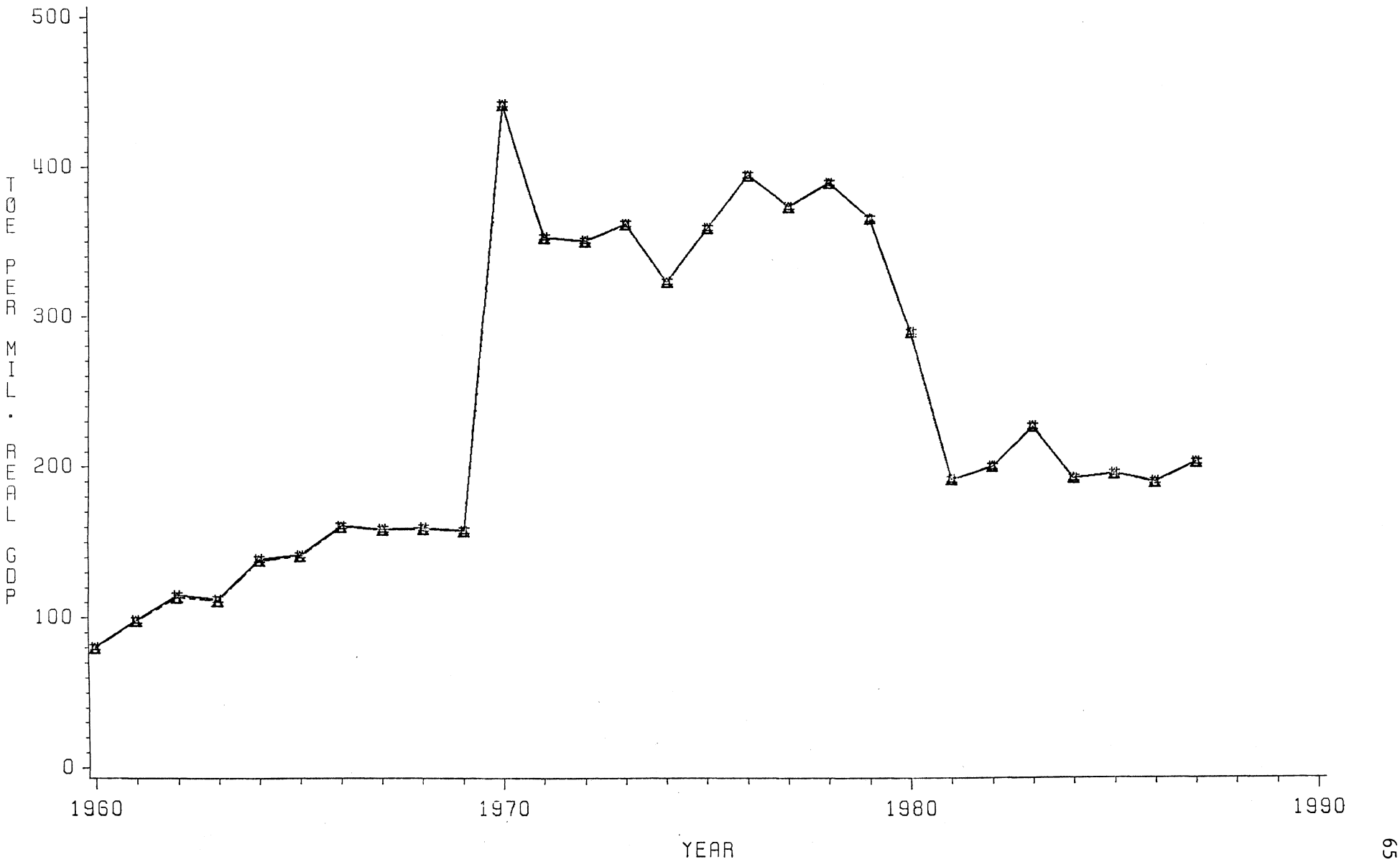
PHILPPINES



ENERGY/GDP------HASH OIL/GDP------ TRIANGLE

ENERGY/GDP AND OIL/GDP

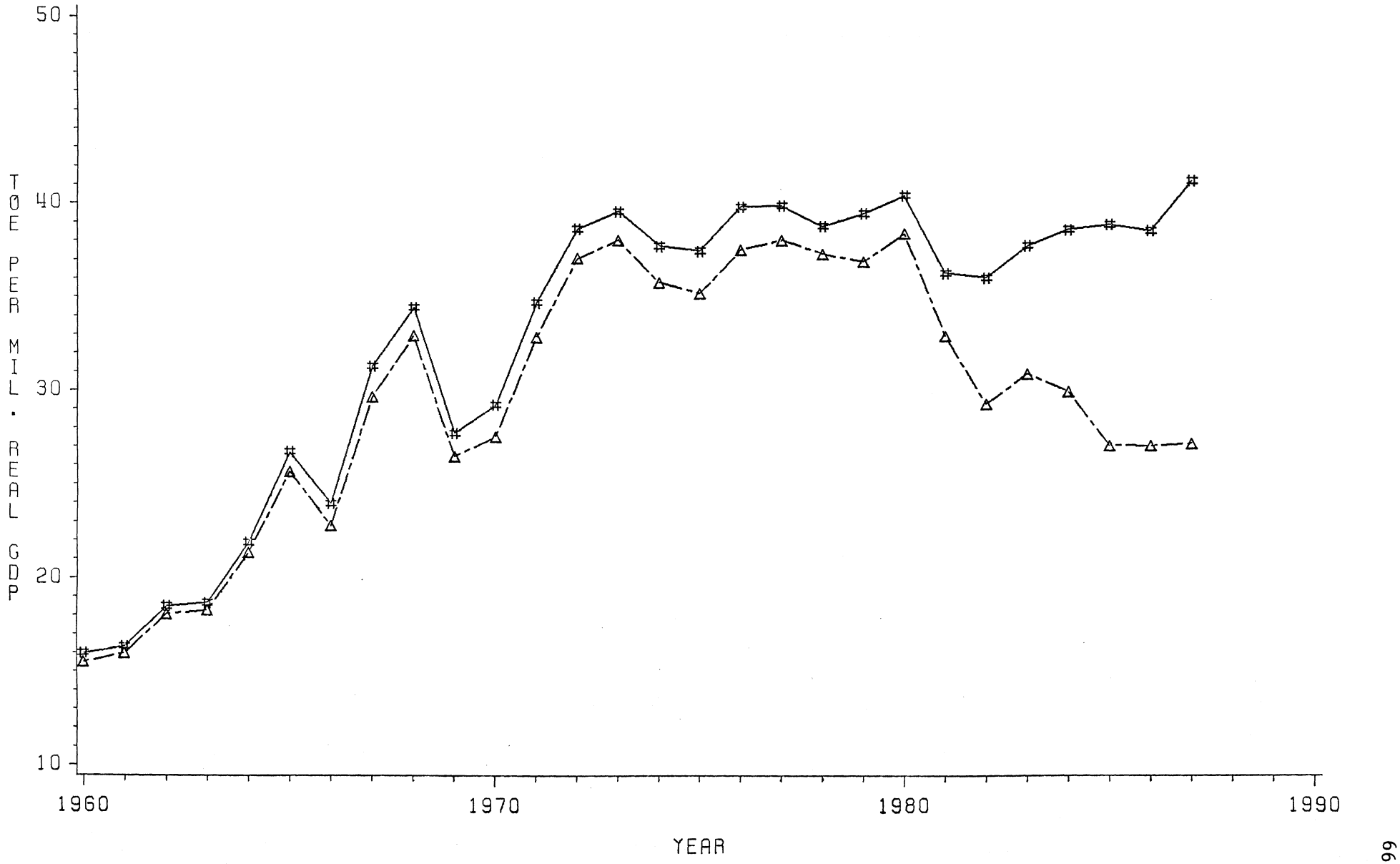
SINGAPORE



ENERGY/GDP------HASH ØIL/GDP------ TRIANGLE

ENERGY/GDP AND OIL/GDP

THAILAND



ENERGY/GDP AND OIL/GDP

TAIWAN